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THE COLOR COMPUTER MONTHLY MAGAZINE

January 1991 Vol. X No. 6

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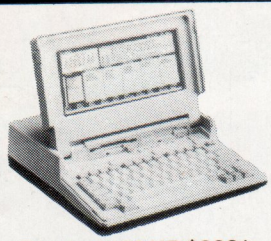

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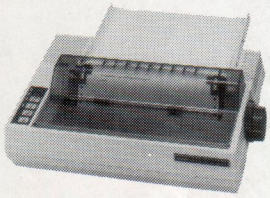

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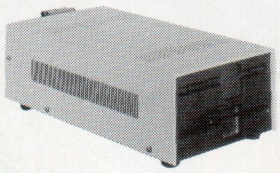

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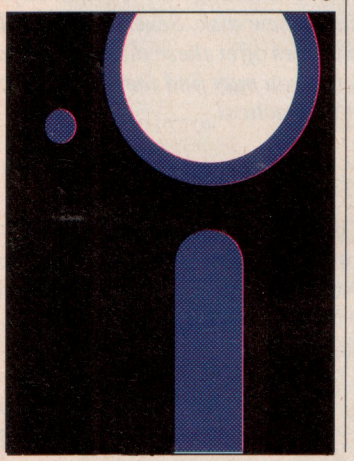

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Letters to the RAINBOW

Filing with Tapes

Editor:

In the March 1988 issue of THE RAINBOW in the Utilities section of Novices Niche, I read about creating data files for a 16K disk system (Page 74). The article was written by Raymond Doss. Mr. Doss stated his program can be modified for tape systems. What do I have to change to get this file system working with tapes?

Charles Crutchfield
5649 W. Virginia Avenue
Phoenix, AZ 85035

First, since you are planning to use the routine for tape, remove the request for a filename extension from Line 100. Now change the device number, #1, to #-1 in lines 100, 110, 120, 140, 150 and 180. Finally change `EOF(1)` *in Line 160 to* `EOF(-1)`.

Kudos to Eversoft, Ltd.

Editor:

I'm writing to tell you about the heart-warming treatment I received from Eversoft of Arlington, Washington. I was looking for two software programs, and I wrote to several of THE RAINBOW's advertisers. I received a letter from Eversoft stating they did not have the programs. A short time later I received another letter from Eversoft directing me to an ad in the October issue of THE RAINBOW for a similar program, but from a different company. I thought this was a very caring thing to do. Hurrah for people like those at Eversoft.

L. Grube
St. Petersburg, Florida

Looking for Flippies

Editor:

I commend THE RAINBOW for a great CoCoFest in Atlanta. The accommodations and sponsors were outstanding. The seminars were very informative and I learned about the programs I am currently using and even more about structuring my own. With the help of Three C's Projects I was able to eliminate a glitch in my backup copy of their software, and I am now on to conquering other worlds.

I have been unable to locate DSDD diskettes for my FD-501 drive. The disks I purchased would not format — I received the infamous I/O Error. I returned them and went to Radio Shack where I saw the DSDD 40-track disks, but these did not have twin notches or alignment holes. I bought a few and notched one, but still could not format. Where can I find true double-sided disks?

Once again, thank you for your CoCoFest. It brought a new era of programming into my home. Keep up the good work!

Roger Rance
4700 Brossy Circle #98
Charleston, SC 29418

We are glad to hear you enjoyed the CoCoFest in Atlanta. However, while we attended the show, it was sponsored by CoCo Pro!, a RAINBOW advertiser. We're sure they'll be happy, too.

Standard DSDD disks do not have the necessary second write-protect and index timing hole. The timing hole is required for formatting a new disk. Several wholesale disk companies offer these disks at special request, but you may find the higher price makes it impractical.

A Powerful Caret

Editor:

I've just purchased a CoCo 3 and a subscription to THE RAINBOW. I have noticed in some of your programs that the ^ is used. Is there another key on the CoCo 3 that replaces it?

Billy Batton
Winter Haven, Florida

The ^ symbol is called a caret. *It is used by computers to denote a variable or number raised to a power. For example,* `X^2` *means "square the value stored in Variable* `X`*." The CoCo uses an up-arrow symbol to denote the caret, but printers accurately print the actual character. To generate a caret, simply press the up arrow key.*

The Trouble with *Home Publisher* . . .

Editor:

I am having a problem with Tandy's *Home Publisher*. What appears on the screen is not what I get on the printer. If I select 80 characters per line, I get 60. If I select 60, I get 40. No matter what point size I choose, the printer gives me the next larger size. I have written to Tandy and received a corrected driver disk, but I'm getting the same results. I wrote to Tandy again and was informed that there is no problem with the program. I have visited my local Radio Shack stores without results.

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Since I can't seem to get support from Tandy, I am turning to THE RAINBOW and the CoCo Community for help. If anyone has any advice, I would greatly appreciate it. My equipment consists of a 128K CoCo 3, FD-502 drive and DMP 132 printer with the Tandy High Resolution Joystick Interface and Metric Industries Model 101 serial-to-parallel interface.

Douglas Bacon
108 Maromas Road
Middletown, CT 06457

Editor:

I have a Color Computer 3 with one disk drive, a B/W television and a DMP-107 printer. I've purchased several programs and find only one of them difficult to understand and use. The culprit is *Home Publisher*. My problems are numerous and I'm getting tired of not being able to adequately use the program.

First of all, the program only prints in Tandy mode, which is OK until I want to use another program with the printer. Also, I can never get the printer to print one column of print (newsletter style) as opposed to two or three columns the first time despite following all start up procedures. I must select three columns, then two columns, then it might print the one column. When entering information on the screen, the margins are not set as wide as the program's visual display shows. It's approximately 4½ inches from the left margin, which is extremely misleading. I've gotten used to having the boundaries displayed to know where to stop, but this slows the input process as well as my creative juices. The print is very large, which is not Tandy mode print. Can you offer assistance in solving my problems with *Home Publisher*?

My second major problem is with the basic use of the computer and the printer. I am not a programmer, but would like to know how to just type something on the computer and have it print without having to type line numbers. Is a definitive program necessary to accomplish this? If so, what is it and how much does it cost?

So far I'm not finding the CoCo 3 too terribly user-friendly!

Sanceria Thomas
1105 Mount Olive Avenue
University City, MO 63130

Printing text with your computer, such as a letter or memo, requires a word processor or text editor. Many advertisers carry such products. See the ads for Microcom, Danosoft, Owl-Ware and Cer Comp. In the meantime, every computer has a learning curve. Hang in there and you'll do fine.

Exploring a New World

Editor:

I should be tinkering with my naive attempts at windows, but instead, here I am writing another letter to the Editor.

A few months ago I wrote to gripe about what's happening to our magazine. I stand firm on my complaint. I don't like the trend I'm seeing. There must be a way to reverse this backward evolution. (And I hate the saddle-stitch format!) However, this time I'm writing in defense of THE RAINBOW and the CoCo Community as a whole. (And, by the way, to thank you for giving us back our protective wrapper. It's a step in the right direction.)

The letter from Jim Price in your September issue has been gnawing on me and it demands a response. He would have us believe that the evil forces of "OS-9 and machine language gibberish" have lately invaded, and are taking over, THE RAINBOW. If his feelings are, as he suggests, shared by other CoCo users, then we are in big trouble.

I believe Mr. Price should take a close look at the very issue in which his letter appears. Of course, he probably won't buy the issue, since those horrible words "Assembly Language" appear right on the front cover.

The theme of the issue is education and Lonnie sums it up rather nicely in "Print #-2." Isn't the CoCo, among other things, a tool for learning? Of course it is! Isn't THE RAINBOW our prime support for that learning? Of course it is! Is Mr. Price's stagnant outlook infecting our community? I certainly hope not!

I've been learning with the CoCo for several years and have found the more I learn the more useful my CoCo becomes. I never would have tried my hand at assembly language had it not been for Bill Barden's ravings in THE RAINBOW. I've learned to work with it and now know how useful it can be. I've gained this knowledge through articles devoted to such "gibberish" published in THE RAINBOW.

Until last Christmas, I was frustrated because THE RAINBOW was becoming primarily a CoCo 3 magazine with little "good usable material" for my CoCo 2. Unlike Mr. Price, though, I accepted reality. THE RAINBOW was simply growing with the CoCo and I was fast becoming part of a dwindling minority.

I was also intimidated by OS-9. It was intriguing, but seemed too complex and hostile. I didn't have it and had no plans to buy it. I'd always read the articles, though, trying to learn why those "weirdos" were so attached to it.

Last Christmas I finally gave in and bought a CoCo 3. A month later I dared and bought OS-9. Now I'm just as lost and confused as I was several years ago when I powered up my first 4K "Gray box." And I'm just as excited. OS-9 Level II is mind-boggling, but its power is even more mind-boggling. I'm learning and, even as a stumbling novice, I've stunned a couple of friends by casually making my "cheap little CoCo" do things their high-dollar PCs can't. Why? Because articles devoted to such "gibberish" are published in THE RAINBOW!

Will I shun BASIC just because I'm trying to learn something new? No! I've used BASIC for years. It's an old friend and I'll continue using it. (I did, however, purchase Burke & Burke's RSB. Running BASIC while exploring OS-9 has great potential.)

Do I expect THE RAINBOW to devote itself to OS-9 just because it's what I'm trying to learn? Not on your tintype! I'll type in the one-liners and the listings in "Novices Niche" or anything else. I'll read "Turn of the Screw" since I'm an engineer and a hardware hacker. I'll read the consultations and the product reviews. I'll digest every word cover-to-cover and grumble because the covers are too close together these days. I may or may not find some "good usable material". The odds are I'll learn, or re-learn, something before I'm done and will enjoy the reading.

The fact that I'll also type in the OS-9 listings does not mean I'm some kind of freak, as Mr. Price suggests. It simply means I'm exploring a new world. It's a very impressive new world and, though I'll consider myself a novice for a long time to come, I already understand why those "weirdos" have been pushing it for so long. I also understand why OS-9 and machine

Continued on Page 93

For the Love of CoCo

Cecil Houk, owner of Rulaford Research, sent us this picture of the license plate on his car. We've seen the plate game played countless ways, but few are as simple and meaningful as this. Hmmmm . . . we wonder if anyone has put 6809#1 on their plates?

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Create, edit Application Information files & icons from multivue. Only $**24.95**

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In-memory disk drive! A must for every OS9 user. Req 512K. Disk Only $**29.95**

From Burke & Burke

RSB v1.3: The revolutionary program that allows you to use Basic from under OS9 Level II. **$39.95**

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EZGen Version 1.6: Powerful OS9 Bootfile editor. Change names, add/delete modules, patch bytes, etc. Only **$19.95**

From Alpha Software

OS9 Level II BBS: Best BBS for OS9. Comes with terminal program. Req. 512K & RS232 Pack. Only $**29.95**

Level II Tools: 25 Utilities such as windowing, wildcards, tree, etc. **$29.95**

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Keeping the Spirit

What is special about the CoCo Community? I think it is best exemplified by the word *ruarch*, a Hebrew word that means spirit and vigor. Even a decade after the first Color Computer was introduced, there is still new spirit and vigor in our community. This ongoing vitality is due to new programs for our CoCos, more powerful upgrades and also the new members of our Community.

Those who regularly read this space have seen examples of how the CoCo can change lives. To borrow from Ivory Soap, I claim that 99 and $^{44}/_{100}$ percent of these changes have been improvements. How hath some of these changes been wrought? Let me share with you a letter I received a couple of months ago, and my response.

Dear Lonnie,

I have just completed what will be my final article for THE RAINBOW. It has been my pleasure to contribute to your fine publication, the little newsletter that grew!

Computer Island is approaching the end of its run. Orders and inquiries are few and far between. We are winding down gracefully and with no regrets.

What an experience this has been. We have learned so much, met so many people and savored their differences as well as their similarities. In addition to all the practical things we learned, such as accounting, advertising, programming, offset printing, state sales tax returns and non-reproducing graph paper, we also learned that opportunity still exists. A simple statement, "let's see if we can sell this program," can lead to Computer Island. We grew from the experience, as did our children.

Speaking of children, we have some news. Our oldest child, Adam, was married on October 28th. Can you believe the little guy who helped at RAINBOWfests and worked with us at home is now a college graduate and a married man? He's a big guy now! Our other RAINBOWfest helper, David, is a high school senior and Shari (the baby), an infant when Computer Island began, is in fourth grade. The years have certainly flown by, but they surely have been good years.

Thanks for all your help over these years. Having THE RAINBOW as an advertising vehicle was the key to Computer Island's success. Lots of companies have good products, but no way to let the public know about them. You provided us the means to get the message out to a targeted market. What could be better? We appreciate it so much.

Keep in touch and stay well. Regards to your family. Best of luck in all Falsoft endeavors.

Sincerely,

Steve and Cheryl Blyn

Dear Steve and Cheryl,

I remember when I would call to discuss advertising or one of your new products and Cheryl would interrupt negotiations because Shari was crying for her bottle. I also remember when Adam "disappeared" at RAINBOWfest for a half an hour to look at games somewhere else. And that sales at the shows picked up considerably when Cheryl was present. She became the "boss of the booth."

But most of all I think the whole CoCo Community remembers the thousands of hours you have devoted to it down through the years with both Computer Island and also through Steve's magnificent columns! You have touched so many lives. We all owe you a debt of thanks.

Steve, I know with your successful career you have had little time to develop your line in the past years, but your columns have been excellent. And your contributions to this Community beyond comprehension. We will miss you and your entire family.

Best of luck, good wishes and fond thoughts from *all* of us.

— Lonnie Falk

...Just think of any word processing feature, chances are Word Power has it...packs a lot of features...excellent word processor..." **Word Proc. Comparison**-April 1989 Rainbow; Pg 26.

Word Power 3.3

The Best Just Got Better!

"...friendly...amazing execution speed...much easier to use than VIP software & 2 other systems I've tried...very user friendly...highest among word-processors"-Rainbow Oct 88 Rev.

SPEED

Blazing Fast! Runs at **2 Mhz** and uses the standard text screens for lightning fast execu-

MEMORY

Word Power 3.3 allows **72K** of workspace on a 128K CoCo and **460K** on a 512K CoCo. More memory than any other word processor. Period.

DISPLAY

Choice of **40** or **80** columns with your choice of colors. Can be used with RGB/ Composite/Mono-chrome Monitors and TV. Pull down menus, plain english prompts, on-screen underlining and page break display make

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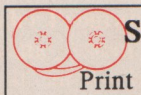

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Print and Edit documents at the same

SORTING

Sort lists in a flash!

CALCULATOR

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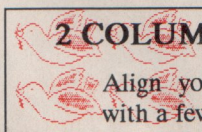


2 COLUMN PRINTING

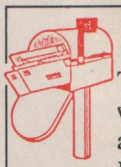
Align your text in 2 columns with a few keystrokes!

GRAPHICS

Insert **graphics** in your documents! Allows you to im-port PMODE 3/4, HSCREEN and CoCo Max

SPLIT-SCREEN EDITING

Freeze a portion of text and edit another. Its fantastic!



MAIL MERGE

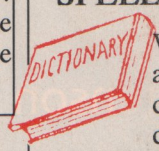
Type a letter, follow it with a list of names & addresses and have Word Power print out personal-ized letters. Its that easy!

SAVING / LOADING

Creates ASCII files that are compatible with other word-processors, terminal programs, etc. Allows directory point & select for easy loading/saving, **Automatic Backup**, file erase, free space display. **ARE YOU SURE?** prompts prevent accidental deletes. The **Auto-Save** feature automatically saves text to disk during user-defined intervals for peace of mind. Supports double-sided drives.

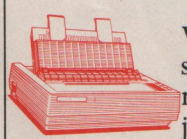
MACROS

Playback up to 250 keystrokes with a sin-gle key! Automate multiple tasks with a single key! You'll love it!



SPELLING CHECKER

Word Power 3.3 include a **80,000** word spelling checker which finds and corrects mistakes in your text.

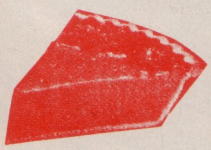


PRINTING

Works with **all** printers that work with the CoCo. Allows options such as baud rates, spacing, page/print pause, partial print, page numbering/ placement, linefeeds, multi-line headers/footers, right justification and number of copies. The values of these options can be changed in the text by embedding Printer Option Codes. The **WHAT YOU SEE IS WHAT YOU GET** feature allows you to preview the text on the screen as it will appear on the printer. You can view margins, page breaks,

PUNCTUATION CHECKER

This checker will proofread your text for punctuation errors such as capitalization, dou-ble-words, a/an usage, spaces and more. Its the perfect addition to any word-proccessor.



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DISK MASTER 3

Seven menu-driven utilities allowing you to take control of your disk system on a CoCo 3

by Mike Jorgenson

Disk Master 3 is a comprehensive system of utility modules for the Color Computer 3. The system consists of a boot program, a configuration program and seven utility programs that operate in a modular fashion. *Disk Master 3* allows you to edit disks, copy tagged files, sort disk directories and more.

I have taken considerable care to ensure uniformity and compatibility of *Disk Master 3* with most custom BASIC enhancement utilities such as *ADOS-3*. All of the utility programs have three common features: Pressing D allows you to change the working drive; pressing V lets you view a disk's directory and you can press Q to quit and return to the menu.

The *Disk Master 3* system uses PCLEAR1 for many of its routines. If PMODE graphics have been used prior to loading, the system will not operate — even though this system is both reliable and efficient, it should be used only on start-up. The high-speed mode (POKE65497,0) is used in various routines for data processing, but never during disk access.

Follow the system prompts carefully when changing disks, especially when working with your master. The system makes use of error-trapping routines, but some custom BASIC enhancement utilities sidestep these traps when a disk-access error occurs.

Before using *Disk Master 3* be sure to run CONFIG to establish your custom operating parameters, which have been pre-set for Disk BASIC. It is a good idea to make a backup copy of your system master disk immediately after creating the custom master. Now run BOOT when you want to use the system.

The Configuration Program

This program allows you to set up the various operating parameters and/or helpful features used with this system. As a safety measure, *Disk Master 3* will not operate unless the master disk has been configured. The system can check this since CONFIG saves your custom configuration data in an unused portion of the directory track, Track 17. The features that can be pre-set are shown in Figure 1.

Once the system is configured, these operating features are always provided on start-up. Should you find it necessary to change a pre-set parameter, you will have to reconfigure the system master disk. However, disk verification and the default text-screen width can be alternately toggled from the utility loader program.

The Loader Program

BOOT is the system loader for the utility modules. It can also be used to customize your BASIC DOS, depending on how it is configured. Pressing ESC clears the system from memory and exits to BASIC while restraining any customized features.

F1 is used to alternate between the 40- and 80-column text screen default. Pressing F2 toggles disk verification on or off as needed. Pressing ALT displays the disk directory on the default screen. The display includes extensions, granule allocations and any free space that remains.

Edit Master 3

This module is used to scan or edit a disk by track and sector. When editing a disk, move the cursor to the character to be changed and enter the CHR$ code for a new character. Then resave the sector to disk by pressing W when finished. Press ESC to abort the Edit mode.

Monochrome monitor display — disables colorburst
Foreground/background colors — 32/40/80 column text
Default text screen width — select 40/80 columns
Read/write I/O verification — set verify on or off
True lowercase in 32-column width — as 40/80 column text
40-track drive operation — allows 78 granules per disk
Drive step rate — for smoother drive operation
Double-sided drives option — 0/2 and 1/3 configuration
Select a printer baud rate — 6 options (600-9600)

Figure 1: *Disk Master 3* Configuration Parameters

When scanning a disk, the up and down arrow keys provide continuous scrolling. The Spacebar can be used to pause and resume the display. The left and right arrow keys cause the program to display the next sector of the track and then pause for an input command.

List Master 3

This module is useful for reviewing an ASCII text or data file. The output can be directed to the monitor/TV or printer. You can specify characters per line, lines per page, space between paragraphs and auto-page numbering as needed. You can also review or make a hardcopy of any BASIC program that is saved in ASCII format.

When making a hardcopy, pressing ENTER sets the output default as indicated. The printout is intended for standard or legal typewriter paper and printing pauses at the end of each page.

When reviewing a file onscreen, the Spacebar pauses and resumes the display. The F1 key is used to toggle between the user's pre-set screen-color selections and the inverse of those colors. Pressing F2 starts a file and sends the output to the printer. Use ESC to exit the File Review mode.

Test Master 3

This module provides an extensive diagnostic drive test. As a safety precaution, you should always insert a blank, formatted disk into the working drive before proceeding with *Test Master 3*. This module performs the following tests:

Step the working drive in or out
Step the head to a specified track
Re-set the drive head to Track 0
Toggle the drive motor on or off
Check the drive indicator light and the write-protection routine
Read and write verification test
Check drive speed (RPM test)

Note that the read/write verification test will not work with any disk having data on its directory track. The disk must be blank.

Track Master 3

This module allows you to make a 35- or 40-track backup to any combination of drives. The module copies five tracks on each pass and has an optional read/write-error bypass routine for problem disks. When the backup is completed, this module will run again with the same configuration, if needed. A normal 35-track, non-verified, multi-drive backup takes approximately 90 seconds.

Copy Master 3

This module is used to copy or super-copy files to any combination of drives. You can copy everything from one disk to another with the press of a key or copy one or more specified files with a Yes/No/All-

---

Mike Jorgenson is an outdoorsman who likes to read and write fiction stories. He also enjoys music, sports, computer programming and working with electronic equipment. Mike can be contacted at 749 Tower Blvd., Lorain, OH 44052, (216) 282-9355. Please include an SASE when requesting a reply.

The-Rest prompt. When making a single-drive copy, this utility handles files of up to 10 granules with just one swap.

Note: If you have ADOS-3 in memory or EPROM, using this module to replace existing disk files will distort the display screen.

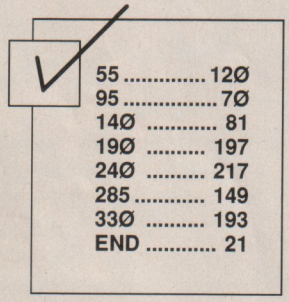
Kill Master 3

This is similar to *Copy Master 3*, except that a Want to Reconsider? prompt has been added before command execution as a safety measure.

Sort Master 3

This module is used to sort a disk's directory alphabetically, by extension or by file type. This is quick, efficient and quite helpful when organizing a software collection. ❑

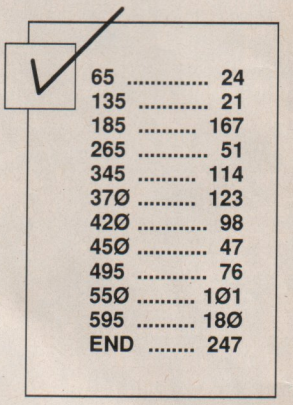
CoCo 3 Disk



```
55 ..... 120
95 ..... 70
140 ..... 81
190 ..... 197
240 ..... 217
285 ..... 149
330 ..... 193
END ..... 21
```

Listing 1: CONFIG

```
0 'DISK MASTER 3
   WRITTEN BY MIKE JORGENSON
   COPYRIGHT (C) JANUARY 1991
   BY FALSOFT, INC.
10 ' Disk Master 3
15 ' Configure File
20 ' Coco 3 Utility
25 ' Mike Jorgenson
30 '
35 CLEAR2500:D1=PEEK(2394)
40 ONERR GOTO360:ONBRK GOTO370
45 DSKI$ D1,17,18,Y$,Z$:V=VAL(MI
D$(Y$,1,1)):IFV<1 OR V>2THENPALE
TTE0,11:PALETTE8,59:GOTO65
50 BG=VAL(MID$(Y$,8,2))
55 FG=VAL(MID$(Y$,10,2))
60 PALETTE0,BG:PALETTE8,FG
65 PALETTE9,52:MID$(Y$,1,1)="1":
FORX=2TO18:MID$(Y$,X,1)="0"
70 NEXT:WIDTH40:CLS1:LOCATE7,0:A
TTR1,0,B:PRINT"<<< Configure Mas
ter 3 >>>":ATTR0,0
75 LOCATE3,5:PRINT"Monochrome Mo
nitor:      <Y/N> ? ";
80 GOSUB375:IFQ$="Y"THEN MID$(Y$
,1,1)="2"ELSEIFQ$<>"N"THEN80
85 PRINTQ$:LOCATE3,8:PRINT"32 Co
lumn Color Set <0-63>":PRINT
90 LINEINPUT"   Background Palet
te       =     ";Q$:Q=VAL(Q$):IF
(Q<1AND Q$<>"0")OR Q>63THEN90
95 IFQ<10THENQ$="0"+Q$
100 MID$(Y$,2,2)=Q$
105 LINEINPUT"   Foreground Pale
tte      =     ";Q$:Q=VAL(Q$):I
F(Q<1AND Q$<>"0")OR Q>63THEN105
110 IFQ<10THENQ$="0"+Q$
115 MID$(Y$,4,2)=Q$
120 LINEINPUT"   Foreground Disp
lay      =     ";Q$:Q=VAL(Q$):I
F(Q<1AND Q$<>"0")OR Q>63THEN120
125 IFQ<10THENQ$="0"+Q$
130 MID$(Y$,6,2)=Q$
135 PRINT:PRINT"   40/80 Column
Colors <0-63>":PRINT
140 LINEINPUT"   Background Pale
tte      =     ";Q$:Q=VAL(Q$):I
F(Q<1AND Q$<>"0")OR Q>63THEN140
145 IFQ<10THENQ$="0"+Q$
150 MID$(Y$,8,2)=Q$
155 LINEINPUT"   Foreground Pale
tte      =     ";Q$:Q=VAL(Q$):I
F(Q<1AND Q$<>"0")OR Q>63THEN155
160 IFQ<10THENQ$="0"+Q$
165 MID$(Y$,10,2)=Q$
170 PRINT:PRINT:PRINT"   Set Tex
t Width To 80:    <Y/N> ? ";
175 GOSUB375:IFQ$="Y"THEN MID$(Y
$,12,1)="1"ELSEIFQ$<>"N"THEN175
180 PRINTQ$:PRINT:PRINT"   Want
Disk Verify On:     <Y/N> ? ";
185 GOSUB375:IFQ$="Y"THEN MID$(Y
$,13,1)="1"ELSEIFQ$<>"N"THEN185
190 PRINTQ$:PRINT:PRINT"   Do Yo
u Have Lowercase":PRINT"   Confi
ged For WIDTH32:    <Y/N> ? ";
195 GOSUB375:IFQ$="Y"THEN215
200 IFQ$<>"N"THEN195
205 PRINTQ$:PRINT:PRINT"   Want
Lowercase Poke:     <Y/N> ? ";
210 GOSUB375:IFQ$="Y"THEN MID$(Y
$,14,1)="1"ELSEIFQ$<>"N"THEN210
215 PRINTQ$:PRINT:PRINT"   Do Yo
u Have 40-TRACK":PRINT"   Disk D
rive Operation:    <Y/N> ? ";
220 GOSUB375:IFQ$="Y"THEN240
225 IFQ$<>"N"THEN220
230 PRINTQ$:PRINT:PRINT"   Want
a 40-TRACK Poke:    <Y/N> ? ";
235 GOSUB375:IFQ$="Y"THEN MID$(Y
$,15,1)="1"ELSEIFQ$<>"N"THEN235
240 PRINTQ$:PRINT:PRINT"   Want
Step Rate Poke:     <Y/N> ? ";
245 GOSUB375:IFQ$="N"THENPRINTQ$
:GOTO285 ELSEIFQ$<>"Y"THEN245
250 PRINTQ$:PRINT
255 PRINT:PRINT"   <1>  =  30 Mi
llisecond Step Rate.":PRINT:PRIN
T"   <2>  =  20 Millisecond Step
 Rate.":PRINT:PRINT"   <3>  =  1
2 Millisecond Step Rate.":PRINT
260 PRINT"   <4>  =  06 Millisec
ond Step Rate.":PRINT:PRINT"
      Enter a choice ... ";
265 GOSUB375:Q=VAL(Q$)
270 IFQ<1 OR Q>4THEN265
275 MID$(Y$,16,1)=Q$
280 PRINTQ$:PRINT
285 PRINT:PRINT"   Double-Sided
Drives:     <Y/N> ? ";
290 GOSUB375:IFQ$="N"THEN310
295 IFQ$<>"Y"THEN290
300 PRINTQ$:PRINT:PRINT"   Drive
 Configure Poke:    <Y/N> ? ";
305 GOSUB375:IFQ$="Y"THEN MID$(Y
$,17,1)="1"ELSEIFQ$<>"N"THEN305
310 PRINTQ$:PRINT:PRINT"   Print
er Output Poke:     <Y/N> ? ";
315 GOSUB375:IFQ$="N"THEN350
320 IFQ$<>"Y"THEN315
325 PRINTQ$:PRINT:PRINT:PRINT"
 <1>  =  0600 Baud Rate Output."
:PRINT:PRINT"   <2>  =  1200 Bau
d Rate Output.":PRINT:PRINT"   <
3>  =  2400 Baud Rate Output."
330 PRINT:PRINT"   <4>  =  4800
Baud Rate Output.":PRINT:PRINT"
  <5>  =  7200 Baud Rate Output.
":PRINT:PRINT"   <6>  =  9600 Ba
ud Rate Output.":PRINT:PRINT"
      Enter a choice ... ";
335 GOSUB375:Q=VAL(Q$)
340 IFQ<1 OR Q>6THEN335
345 MID$(Y$,18,1)=Q$
350 PRINTQ$:DSKO$ D1,17,18,Y$,Z$
:CLEAR200:WIDTH32:PRINT"OK, YOUR
 DISK IS NOW CONFIGURED."
355 PRINT:END
360 PRINT:PRINT"   System Functi
on Error Detected !!!":SOUND5,7
365 FORX=1TO1650:NEXT
370 CLEAR200:WIDTH32:END
375 Q$=INKEY$:IFQ$=""THEN375
380 RETURN
385 ' END
```



```
65 ..... 24
135 ..... 21
185 ..... 167
265 ..... 51
345 ..... 114
370 ..... 123
420 ..... 98
450 ..... 47
495 ..... 76
550 ..... 101
595 ..... 180
END ..... 247
```

Listing 2: BOOT

```
0 'DISK MASTER 3
   WRITTEN BY MIKE JORGENSON
   COPYRIGHT (C) JANUARY 1991
   BY FALSOFT, INC.
10 ' Disk Master 3
15 ' Boot Load File
20 ' Coco 3 Utility
25 ' Mike Jorgenson
30 '
35 PCLEAR1:CLEAR2500
40 RGB:WIDTH32:CLS0:P=1
45 IF PEEK(32762)=1THEN60
50 CLEAR2500,32762:POKE113,0
55 POKE32762,1:VERIFYOFF
60 D1=PEEK(2394):IFP=1THEN120
65 DSKI$ D1,17,18,Y$,Z$:V=VAL(MI
D$(Y$,1,1)):IFV=2THEN POKE57395,
16:POKE57404,19:POKE57413,19
70 IFV<1 OR V>2THEN550
75 FORX=32763 TO 32767:K=K+2:POK
EX,VAL(MID$(Y$,K,2)):NEXT
80 POKE32768,VAL(MID$(Y$,12,1))
85 VF = VAL(MID$(Y$,13,1))
90 LC = VAL(MID$(Y$,14,1))
95 TK = VAL(MID$(Y$,15,1))
100 SR = VAL(MID$(Y$,16,1))
105 DS = VAL(MID$(Y$,17,1))
```

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CoCo 3 Service Manual **$39.95**
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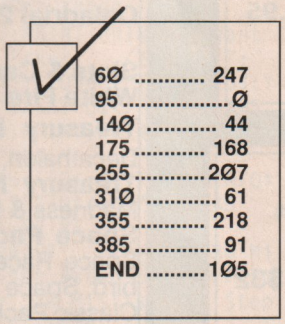
```
110 PB = VAL(MID$(Y$,18,1))
115 '
120 X=32763:B1=PEEK(X)
125 F1=PEEK(X+1):FD=PEEK(X+2)
130 B2=PEEK(X+3):F2=PEEK(X+4)
135 TW=PEEK(X+5):PALETTE8,0:DIM
FL$(78),GR(78):F$=STRING$(32,191
):G$=STRING$(32,175):H$=CHR$(175
)+STRING$(30,32)+CHR$(175)
140 ON ERR GOTO560:ON BRK GOTO58
0:PALETTE12,FD:PALETTE13,0:CLS
145 PRINT@0,F$:PRINT@32,F$:PRINT
@3,"  <<< DISK MASTER 3 >>>  ";:
PRINT@64,G$:FORX=96TO384 STEP32:
PRINT@X,H$:NEXT:PRINT@416,G$;:PR
INT@448,F$;:PRINT@482,"COPYRIGHT
  <C>  JANUARY 1988";
150 '
155 IF P=1THEN355
160 IF VF=1THENVERIFYON
165 IF LC<>1THEN180
170 POKE &H167,57
175 POKE &HFF22,21
180 IF DS<>1THEN205
185 POKE &HD89D,1
190 POKE &HD89E,2
195 POKE &HD89F,65
200 POKE &HD8A0,66
205 IF SR=1THENSP=23:ST=3
210 IF SR=2THENSP=22:ST=2
215 IF SR=3THENSP=21:ST=1
220 IF SR=4THENSP=20:ST=0
225 IF SP<1THEN240
230 POKE &HD7C0,ST
235 POKE &HD816,SP
240 IF PB=1THENBP=87
245 IF PB=2THENBP=40
250 IF PB=3THENBP=18
255 IF PB=4THENBP=7
260 IF PB=5THENBP=3
265 IF PB=6THENBP=1
270 IF BP<1THEN280
275 POKE &H96,BP
280 IF TK<>1THEN355
285 TK=40:GR=TK*2-2
290 POKE &HD29D,TK
295 POKE &HD65F,TK
300 POKE &HD682,TK
305 POKE &HD44D,GR
310 POKE &HC735,GR
315 POKE &HC7BB,GR
320 POKE &HC7D0,GR
325 POKE &HC7EF,GR
330 POKE &HCD26,GR
335 POKE &HCEB5,GR
340 POKE &HD534,TK-1
345 POKE &HC75A,1
350 '
355 D$(1)="<1>  =  LOAD: Copy Ma
ster 3":D$(2)="<2>  =  LOAD: Edi
t Master 3":D$(3)="<3>  =  LOAD:
 Kill Master 3":D$(4)="<4>  =  L
OAD: List Master 3"
360 D$(5)="<5>  =  LOAD: Sort Ma
ster 3":D$(6)="<6>  =  LOAD: Tes
t Master 3":D$(7)="<7>  =  LOAD:
 Trak Master 3"
365 POKE65497,0:Q=0:FORX= 129TO3
21 STEP32:Q=Q+1:FORY= 1TO27:PRIN
T@X+Y,MID$(D$(Q),Y,1);:NEXTY,X
370 POKE65496,0:X=0:PRINT@391,"E
nter A Choice ...";:PRINT@482,"
 <F1>  <ALT>  <ESC>  <F2>  ";
375 Q$=INKEY$:IFQ$=""THEN520
380 A=ASC(Q$):IFA=4THEN405
385 IFA=103 OR A=226THEN410
390 IFA=64THEN430
395 Q=VAL(Q$):ON Q GOTO605,610,6
15,620,625,630,635
400 SOUND5,3:GOTO375
405 IF PEEK(2439)=255THENVERIFY
OFF:PRINT@482,"Disk Verification
 Is Now Off";:GOTO420 ELSEVERIFY
 ON:PRINT@482,"Disk Verification
 Is Now On.";:GOTO420
410 IFTW=1THENTW=0 ELSETW=1
415 PRINT@482,"Text Display Widt
h Is Now"TW*40+40;:POKE32768,TW
420 SOUND100,6:FORX=1TO1000
425 NEXT:GOTO370
430 PRINT@482,"View Disk Of What
 Drive: 0/3";:GOSUB540
435 Q=VAL(Q$):IFQ>3THEN370
440 PRINT@482,"Reading Directory
 Of Drive"Q;:DSKI$ Q,17,2,X$,Y$
445 DF=0:FORX=3TO9:DSKI$ Q,17,X,
Y$,Z$:FORK=1TO128 STEP32:GOSUB45
0:NEXTK:Y$=Z$:FORK=1TO128 STEP32
:GOSUB450:NEXTK,X:GOTO465
450 SB$=MID$(Y$,K,14):L$=LEFT$(S
B$,1):IF ASC(SB$)>127 OR L$=CHR$
(0)THENRETURN ELSEIFL$=CHR$(255)
THEN465 ELSEDF=DF+1:Y=ASC(RIGHT$
(SB$,1))+1:FL$(DF)=LEFT$(SB$,8)+
"."+MID$(SB$,9,3)
455 GR(DF)=GR(DF)+1:Z=ASC(MID$(X
$,Y,1)):IFZ<78THENY=Z+1:GOTO455
460 RETURN
465 IFDF<1THENPRINT@482,"NO FILE
S IN DISK'S DIRECTORY";:SOUND5,7
:FORX=1TO1500:NEXT:GOTO370
470 K=1:F=FREE(Q)
475 POKE65497,0:ON ERR GOTO555
480 PALETTE0,B2:PALETTE8,F2
485 IFTW=1THENT$=STRING$(23,32):
WIDTH80 ELSET$="   ":WIDTH40
490 CLS1:PRINTT$"       <<< Direc
tory Of"Q">>>":LOCATE0,6
495 FORX=1TO DF:IF GR(X)<10THENF
L$(X)=FL$(X)+" "+STR$(GR(X))ELSE
FL$(X)=FL$(X)+STR$(GR(X))
500 IFK=1THENK=0:PRINTT$;FL$(X)"
 "; ELSEK=1:PRINT"   "FL$(X)
505 NEXT:IFK=1THENPRINTT$"Free =
"F ELSEPRINT"   Free ="F:PRINT
510 PRINT:Q$=INKEY$:POKE65496,0
515 PRINTT$"  Press Any Key When
 Ready ... ";:GOSUB540:RUN
520 IFX=0THENX=1:PRINT@406,"   "
;ELSEX=0:PRINT@406,"...";
525 FORK=1TO30:NEXT:GOTO375
530 SOUND5,7:FORX=1TO165
535 NEXT:RETURN
540 Q$=INKEY$:IFQ$=""THEN540
545 RETURN
550 PRINT" << DISK MUST BE CONFI
GURED! >>";:GOSUB530:EXEC40999
555 POKE65496,0:GOSUB530:GOTO570
560 POKE65496,0:IF ERNO=26THENPR
INT@482,"File Not In Disk's Dire
ctory";:GOSUB530:RUN
565 PRINR@481,"System Function E
rror Detected";:GOSUB530
570 WIDTH32:PALETTE12,F1
575 PALETTE13,B1:END
580 WIDTH32:POKE65496,0
585 PALETTE12,F1:PALETTE13,B1
590 CLEAR200,32768:PRINT"  ENHAN
CED DISK EXTENDED BASIC    DISK
MASTER 3 UTILITY SYSTEM    Mike
Jorgenson / JAN 01 1988"
595 PCLEAR4:PRINT:PRINT:NEW
600 '
605 LOAD "COPY/SYS",R
610 LOAD "EDIT/SYS",R
615 LOAD "KILL/SYS",R
620 LOAD "LIST/SYS",R
625 LOAD "SORT/SYS",R
630 LOAD "TEST/SYS",R
635 LOAD "TRAK/SYS",R
640 ' *** END ***
```



Listing 3: EDIT.SYS

```
0 'DISK MASTER 3
   WRITTEN BY MIKE JORGENSON
   COPYRIGHT (C) JANUARY 1991
   BY FALSOFT, INC.
10 ' Edit Master 3
15 ' Coco 3 Utility
20 ' Mike Jorgenson
25 '
30 CLEAR5000:POKE65497,0
35 DIMFL$(78),GR(78):X=32763
40 D1=PEEK(2394):B1=PEEK(X)
45 F1=PEEK(X+1):FD=PEEK(X+2)
50 F$=STRING$(30,128):G$=STRING$
(32,191):H$=STRING$(32,175)
55 X$=STRING$(128,128)
60 PALETTE12,FD:ON BRK GOTO30
65 PALETTE13,0:ON ERR GOTO410
70 CLS:PRINT@0,G$:PRINT@32,G$:PR
INT@4," <<< EDIT MASTER 3 >>> ";
:FORX=96TO352 STEP32:PRINT@X,H$:
NEXT:PRINT@416,G$;:POKE65496,0
75 PRINT@129," <D>= Change Worki
ng Drive    ";:PRINT@193," <E>=
Edit Working Drive Disk ";
80 PRINT@257," <V>= View Working
 Drive Disk ";:PRINT@321," <Q>=
Quit / Return To Menu   ";
85 PRINT@482,"The Working Disk D
rive  = "D1;
90 GOSUB400:Q=INSTR("QVED",Q$)+1
:ONQ GOTO90,420,355,110
95 PRINT@482,"Which Drive 0-3: <
ENTER=0> ? ";:GOSUB400
100 D=VAL(Q$):IFD>3THEN85
105 D1=D:DRIVE D1:GOTO85
110 PRINT@129," Edit The Working
 Drive Disk  ";:PRINT@193,F$;:PR
INT@257,F$;:PRINT@321," <BREAK>
= Abort Disk Editor  ";
115 PRINT@194,"";:LINEINPUT"Ente
r a Track:  <0-39> ? ";T$:T=VAL(
T$):PRINT@223,CHR$(175);
120 IFT<0 OR T>39THEN70
125 PRINT@258,"";:LINEINPUT"Ente
```

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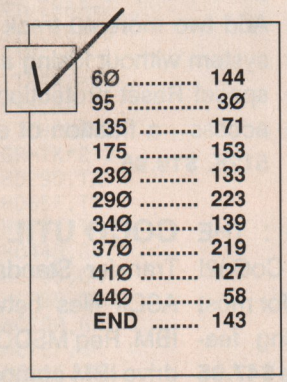
```
r a Sector: <1-18> ? ";S$:S=VAL(
S$):IFS<1 OR S>18THEN70
130 PRINT@384,H$;:PRINT@481,F$;
135 PRINT@128,X$;X$;
140 PRINT@66,"DRIVE"D1" TRACK"T"
 SECTOR"S:DSKI$ D1,T,S,Y$,Z$:POK
E65497,0:FORX=1152TO1279:POKEX,A
SC(MID$(Y$,X-1151,1)):NEXT:FORX=
1280TO1407:POKEX,ASC(MID$(Z$,X-1
279,1)):NEXT:POKE65496,0
145 IFA$<>""THENA$="":GOTO165
150 PRINT@449,"  <F1> = Abort
 <F2> = Edit     Arrow Keys Scro
ll By Sector";:GOSUB400
155 Q=ASC(Q$):IFQ=8THEN190 ELSEI
FQ=9THEN180 ELSEIFQ=103 OR Q=226
THEN30 ELSEIFQ=4THENX=1152:GOTO2
95 ELSEIFQ<>10 ANDQ<>94THEN150
160 PRINT@450,"Scanning By:  Tra
ck & Sector   <SPACEBAR>  =  Pa
use Display";:GOTO175
165 B$=INKEY$:IFB$<>CHR$(32)THEN
175 ELSEPRINT@493,"=  Resume";
170 B$=INKEY$:IFB$=""THEN170 ELS
EIFB$=CHR$(32)THEN160 ELSE150
175 A$=Q$:IFQ$=CHR$(10)THEN190
180 S=S+1:IFS>18THENT=T+1:S=1
185 IFT>39THENRUN ELSE135
190 S=S-1:IFS<1THENT=T-1:S=18
195 IFT<0THENRUN ELSE135
200 Y=PEEK(X)
205 POKEX,43:FORK=1TO20
210 Q$=INKEY$:IFQ$<>""THEN230
215 NEXT:POKEX,Y:FORK=1TO30
220 Q$=INKEY$:IFQ$<>""THEN235
225 NEXT:GOTO205
230 POKEX,Y
235 IFQ$="A"THEN150
240 IFQ$="E"THEN300
245 IFQ$="W"THEN315
250 IFQ$=CHR$(8)THENX=X-1
255 IFQ$=CHR$(9)THENX=X+1
260 IFQ$<>CHR$(10)THEN270
265 X=X+32:IFX>1407THENX=X-32
270 IFQ$<>CHR$(94)THEN280
275 X=X-32:IFX<1152THENX=X+32
280 IFX<1152THENX=1407
285 IFX>1407THENX=1152
290 GOTO200
295 PRINT@449,"<A>=Abort  <E>=Ed
it  <W>=Write   Arrows Scroll Th
rough Sector";:GOTO200
300 PRINT@449,F$:PRINT@481,"<ENT
ER> = Abort Edit Mode ...";:PRIN
T@449,"Change CHR$"Y"To What ? "
;:LINEINPUTQ$:IFQ$=""THEN295
305 Q=VAL(Q$):IFQ>255THEN300
310 POKEX,Q:GOTO295
315 PRINT@449,F$;:PRINT@481,"Wri
te Sector To Disk:  <Y/N> ?";:GO
SUB400:IFQ$<>"Y"THEN295
320 PRINT@481,"OK, Writing Secto
r To Disk ...";
325 Y$="":FORK=1152TO1279
330 Y$=Y$+CHR$(PEEK(K)):NEXT
335 Z$="":FORK=1280TO1407
340 Z$=Z$+CHR$(PEEK(K)):NEXT
345 DSKO$ D1,T,S,Y$,Z$
350 Y$="":Z$="":GOTO150
355 DF=0:PRINT@482,"Reading Your
 Disk Directory.";:DSKI$ D1,17,2
,X$,Y$:FORX=3TO9:DSKI$ D1,17,X,Y
$,Z$:FORK=1TO128 STEP32:GOSUB360
:NEXTK:Y$=Z$:FORK=1TO128 STEP32:
GOSUB360:NEXTK,X:GOTO375
360 SB$=MID$(Y$,K,14):L$=LEFT$(S
B$,1):IF ASC(SB$)>127 OR L$=CHR$
(0)THENRETURN ELSEIFL$=CHR$(255)
THEN375 ELSEDF=DF+1:Y=ASC(RIGHT$
(SB$,1))+1:FL$(DF)=LEFT$(SB$,8)+
"."+MID$(SB$,9,3)
365 GR(DF)=GR(DF)+1:Z=ASC(MID$(X
$,Y,1)):IFZ<78THENY=Z+1:GOTO365
370 RETURN
375 IFDF<1THENPRINT@482,"NO FILE
S IN DISK'S DIRECTORY";:SOUND5,7
:FORX=1TO1500:NEXT:GOTO75
380 K=1:F=FREE(D1):PALETTE12,F1:
PALETTE13,B1:CLS:PRINT@5,"<<< Di
rectory Of"D1">>>":PRINT
385 FORX=1TO DF:IFGR(X)<10THENFL
$(X)=FL$(X)+" "+STR$(GR(X))ELSEF
L$(X)=FL$(X)+STR$(GR(X))
390 IFK=1THENK=0:PRINTFL$(X)" ";
:NEXT ELSEK=1:PRINTFL$(X):NEXT
395 PRINT"Free ="F:PRINT:Q$=INKE
Y$:PRINT@482,"Press Any Key When
 Ready ...";:GOSUB400:RUN
400 Q$=INKEY$:IFQ$=""THEN400
405 RETURN
410 PRINT@481,"System Function E
rror Detected";:SOUND5,7
415 FORX=1TO1650:NEXT:RUN
420 PRINT@482,"Insert System Dis
k & 'ENTER'";:GOSUB400
425 IFQ$<>CHR$(13)THEN420
430 LOAD"BOOT",R
```



60	144
95	30
135	171
175	153
230	133
290	223
340	139
370	219
410	127
440	58
END	143

Listing 4: LIST.SYS

```
0 'DISK MASTER 3
   WRITTEN BY MIKE JORGENSON
   COPYRIGHT (C) JANUARY 1991
   BY FALSOFT, INC.
10 ' List Master 3
15 ' Coco 3 Utility
20 ' Mike Jorgenson
25 '
30 CLEAR7500:X=32763
35 DIMFL$(78),GR(78),X$(9)
40 POKE65497,0:D1=PEEK(2394)
45 B1=PEEK(X):F1=PEEK(X+1)
50 FD=PEEK(X+2):B2=PEEK(X+3)
55 F2=PEEK(X+4):TW=PEEK(X+5)
60 F$=STRING$(30,128):G$=STRING$
(32,191):H$=STRING$(32,175):PALE
TTE8,0:PALETTE12,FD:PALETTE13,0:
ON ERR GOTO395:ON BRK GOTO455
65 WIDTH32:PRINT@0,G$:PRINT@32,G
$:PRINT@4," <<< LIST MASTER 3 >>
>";:PRINT@416,G$
70 FORX=96TO352 STEP32:PRINT@X,H
$:NEXT:POKE65496,0
75 PRINT@129," <D>= Change Worki
ng Drive    ";:PRINT@193," <I>=
Input a Text / Datafile ";
80 PRINT@257," <V>= View Working
 Drive Disk ";:PRINT@321," <Q>=
Quit / Return To Menu    ";
85 PRINT@482,"The Working Disk D
rive  = "D1;
90 GOSUB480:Q=INSTR("QVID",Q$)+1
:ONQ GOTO90,490,410,110
95 PRINT@482,"Which Drive 0-3: <
ENTER=0> ? ";:GOSUB480
100 D=VAL(Q$):IFD>3THEN85
105 D1=D:DRIVE D:GOTO85
110 PRINT@129," Review ASCII Tex
t / Datafile ";:PRINT@193," Ente
r a Filename / Extension ";:PRIN
T@257,F$;:PRINT@321," <BREAK>  =
  Abort ASCII List ";
115 PRINT@258,"";:LINEINPUTA$
120 PRINT@287,CHR$(175);:L=LEN(A
$):IFL<3 OR L>12THEN75
125 GOSUB465:PRINT@482,"Output T
o Printer:   <Y/N> ?";:GOSUB480
130 PALETTE0,B2:PALETTE8,F2:IFTW
=1THENA=77:B=76:C=23:WIDTH80 ELS
EA=37:B=36:C=3:WIDTH40
135 CLS1:IF PEEK(359)=57THEN LC=
1:POKE359,126:POKE65314,4
140 ON ERR GOTO390:IFQ$="Y"THEN2
65 ELSEGOSUB460
145 LOCATE4+C,8:PRINT"<F1>     =
   Change Colors":LOCATE4+C,10:P
RINT"<F2>     =   Restart Again"
:LOCATE3+C,13:PRINT"<SPACE>   =
  Pause Display":LOCATE3+C,15
150 PRINT"<BREAK>   =   Abort Ro
utine":LOCATE3+C,19:PRINT"Press
Any Key When Ready. ";:GOSUB480:
Q=ASC(Q$):IFQ=103ORQ=226THEN240
155 GOSUB460:LOCATE0,7
160 X=EOF(1):IFX= -1THEN385
165 LINEINPUT#1,X$(1)
170 POKE65497,0:Y=1
175 L=LEN(X$(Y)):IFL<A THEN200
180 Y$=X$(Y):X$(Y)=MID$(Y$,1,B):
Z=Y+1:X$(Z)=MID$(Y$,A,L-B)
185 Y$=X$(Z)
190 IF LEFT$(Y$,1)=" "THENX$(Z)=
MID$(Y$,2,LEN(Y$)-1):GOTO185
195 Y=Y+1:GOTO175
200 FORT=1TOY:PRINT"  "X$(T)
205 NEXT:POKE65496,0
210 Q$=INKEY$:IFQ$=""THEN160
215 PRINT:PRINTSTRING$(C,32)"
<F1>  <SPACE>  <BREAK>  <F2>":GO
SUB480:IFQ$=CHR$(103)THEN240
220 IFQ$=CHR$(226)THEN240
225 PRINT:IFQ$<>CHR$(4)THEN160
230 PRINTSTRING$(C,32)"   Output
 To Printer: <Y/N> ? ";:GOSUB480
:IFQ$="Y"THENGOSUB465:GOTO265
235 CLS1:GOSUB465:GOTO155
240 IFP=1THEN255
245 PALETTE0,F2:PALETTE8,B2
250 P=1:GOTO235
255 PALETTE0,B2:PALETTE8,F2
260 P=0:GOTO235
265 GOSUB460:LOCATEC-1,8:LINEINP
UT"Chars Per Line 32-95: <ENTER=
80> ? ";Q$:W=VAL(Q$)
```

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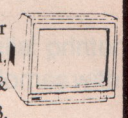

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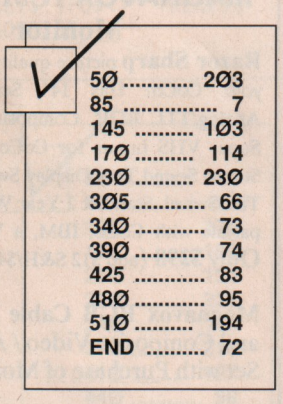
```
270 IFW<32 OR W>95THENW=80
275 LX=W+1:LY=INT(W/2)-7
280 LOCATEC-1,10:LINEINPUT"Lines
 Per Page 10-85: <ENTER=52> ? ";
Q$:K=0:LP=VAL(Q$)
285 IFLP<10 OR LP>85THENLP=52
290 LOCATEC-1,12:PRINT"Space Bet
ween Paragraphs:  <Y/N> ? ";
295 GOSUB480:IFQ$="Y"THENSP=1
300 PRINTQ$:LOCATEC-1,14:PRINT"P
age Numbering From 2 On:  <Y/N>
 ? ";:GOSUB480:IFQ$="Y"THENPN=1
305 PRINTQ$:LOCATEC+2,18:PRINT"P
rintout Will Pause At The End"
310 LOCATEC+2,19:PRINT"Of Page.
 <ENTER> = Continue ";
315 X=EOF(1):IFX= -1THEN380
320 LINEINPUT#1,X$(1)
325 POKE65497,0:Y=1
330 L=LEN(X$(Y)):IFL<LX THEN365
335 Y$=X$(Y):X$(Y)=MID$(Y$,1,W):
Z=Y+1:X$(Z)=MID$(Y$,LX,L-W)
340 XL=W-1:IFMID$(Y$,XL,1)=" "TH
ENX$(Y)=MID$(Y$,1,XL):X$(Z)=MID$
(Y$,W,L-XL)
345 Y$=X$(Z):IFLEN(Y$)<3THENX$(Y
)=X$(Y)+Y$:GOTO365 ELSEIFLEFT$(Y
$,1)<>" "AND MID$(Y$,2,1)=" "THE
NX$(Z)=MID$(Y$,3,LEN(Y$)-2):X$(Y
)=X$(Y)+MID$(Y$,1,1)
350 Y$=X$(Z)
355 IF LEFT$(Y$,1)=" "THENX$(Z)=
MID$(Y$,2,LEN(Y$)-1):GOTO350
360 Y=Y+1:GOTO330
365 POKE65496,0:FORS=1TOY:PRINT#
-2,X$(S):K=K+1:IFK<LP THEN375
370 SOUND100,6:GOSUB480:IFQ$<>CH
R$(13)THEN370 ELSEK=0:IF PN>0THE
NPN=PN+1:PRINT#-2,STRING$(LY,32)
;:PRINT#-2,"<<< PAGE"PN">>>":K=4
:FORT=1TO3:PRINT#-2:NEXTT
375 NEXTS:IFSP=1THENPRINT#-2:K=K
+1:GOTO315 ELSE315
380 SOUND100,6:GOTO455
385 PRINT:PRINT:PRINTSTRING$(C,3
2)"  Press Any Key When Ready ..
. ";:SOUND100,6:GOSUB480:GOTO455
390 CLS:SOUND5,7:GOTO455
395 IF ERNO<>26THEN405
400 PRINT@482,"File Not In Disk'
s Directory";:GOSUB470:RUN
405 PRINT@481,"System Function E
rror Detected";:GOSUB470:RUN
410 DF=0:PRINT@482,"Reading Your
 Disk Directory.";:DSKI$ D1,17,2
,X$,Y$:FORX=3TO9:DSKI$ D1,17,X,Y
$,Z$:FORK=1TO128 STEP32:GOSUB415
:NEXTK:Y$=Z$:FORK=1TO128 STEP32:
GOSUB415:NEXTK,X:GOTO430
415 SB$=MID$(Y$,K,14):L$=LEFT$(S
B$,1):IF ASC(SB$)>127 OR L$=CHR$
(0)THENRETURN ELSEIFL$=CHR$(255)
THEN430 ELSEDF=DF+1:Y=ASC(RIGHT$
(SB$,1))+1:FL$(DF)=LEFT$(SB$,8)+
"."+MID$(SB$,9,3)
420 GR(DF)=GR(DF)+1:Z=ASC(MID$(X
$,Y,1)):IFZ<78THENY=Z+1:GOTO420
425 RETURN
430 IFDF<1THENPRINT@482,"NO FILE
S IN DISK'S DIRECTORY";:SOUND5,7
:FORX=1TO1500:NEXT:GOTO75
435 K=1:F=FREE(D1):PALETTE12,F1:
PALETTE13,B1:CLS:PRINT@5,"<<< Di
rectory Of"D1">>>":PRINT
440 FORX=1TO DF:IFGR(X)<10THENFL
$(X)=FL$(X)+" "+STR$(GR(X))ELSEF
L$(X)=FL$(X)+STR$(GR(X))
445 IFK=1THENK=0:PRINTFL$(X)" ";
:NEXT ELSEK=1:PRINTFL$(X):NEXT
450 PRINT"Free ="F:PRINT:Q$=INKE
Y$:PRINT@482,"Press Any Key When
 Ready ...";:GOSUB480:RUN
455 CLOSE:IF LC=1THENPOKE359,57:
POKE65314,21:RUN ELSERUN
460 CLS:LOCATE6+C,1:PRINT"<<< LI
ST MASTER 3 >>>":RETURN
465 CLOSE:OPEN"I",#1,A$:RETURN
470 SOUND5,7:FORX=1TO1650
475 NEXT:RETURN
480 Q$=INKEY$:IFQ$=""THEN480
485 RETURN
490 PRINT@482,"Insert System Dis
k & 'ENTER'";:GOSUB480
495 IFQ$<>CHR$(13)THEN490
500 LOAD"BOOT",R
```



Listing 5: TEST.SYS

```
0 'DISK MASTER 3
   WRITTEN BY MIKE JORGENSON
   COPYRIGHT (C) JANUARY 1991
   BY FALSOFT, INC.
10 ' Test Master 3
15 ' Coco 3 Utility
20 ' Mike Jorgenson
25 '
30 CLEAR5000:POKE65497,0
35 DIMFL$(78),GR(78):X=32763
40 D1=PEEK(2394):B1=PEEK(X)
45 F1=PEEK(X+1):FD=PEEK(X+2)
50 F$=STRING$(30,128):G$=STRING$
(32,191):H$=STRING$(32,175):PALE
TTE8,0:PALETTE12,FD:PALETTE13,0:
ON ERR GOTO470:ON BRK GOTO530
55 CLS:PRINT@0,G$:PRINT@32,G$:GO
SUB525:PRINT@416,G$
60 FORX=96TO352 STEP32:PRINT@X,H
$:NEXT:POKE65496,0
65 PRINT@129," <D>= Change Worki
ng Drive    ";:PRINT@193," <T>=
Work Drive Systems Test ";
70 PRINT@257," <V>= View Working
 Drive Disk ";:PRINT@321," <Q>=
Quit / Return To Menu    ";
75 PRINT@482,"The Working Disk D
rive  = "D1;
80 GOSUB540:Q=INSTR("QVTD",Q$)+1
:ONQ GOTO80,560,480,100
85 PRINT@482,"Which Drive 0-3: <
ENTER=0> ? ";:GOSUB540
90 D=VAL(Q$):IFD>3THEN75
95 D1=D:DRIVE D:GOTO75
100 PRINT@481,"Insert Formatted
Disk: 'ENTER'";:GOSUB540
105 IFQ$<>CHR$(13)THEN100 ELSECL
S:PALETTE12,F1:PALETTE13,B1
110 CLEAR2500,32000
115 DEFUSR0= 54981
120 SR=&HFF49:SS=&HFF48
125 SL=&HFF40:D1=PEEK(2394)
130 DM=0:TX=39:SI=80:SO=112
135 ONERR GOTO465:ONBRK GOTO530
140 IFD1=0THENCP=41:D4=1 ELSEIFD
1=1THENCP=42:D4=2 ELSEIFD1=2THEN
CP=44:D4=4 ELSECP=104:D4=64
145 GOSUB225:CLS:GOSUB525:PRINT@
65,"<1> = Step Disk Drive In."
150 PRINT" <2> = Step Disk Drive
 Out.":PRINT" <3> = Step To Trac
k Number.":PRINT" <4> = Restore
To Track Zero.":PRINT" <5> = Tog
gle Motor ON / OFF."
155 PRINT" <6> = Disk Read & Wri
te Test.":PRINT" <7> = Drive Spe
ed, RPM Test.":PRINT" <8> = Writ
e Protection Test.":PRINT" <9> =
 Quit / Return To Menu."
160 PRINT@391,"Enter A Choice ..
.":PRINT@449,"TRACK =      ZERO
SWITCH =";:PRINT@481,"DISK DRIVE
 ="D1" /  MOTOR =";
165 K=0:POKE SL,CP
170 PK=PEEK(SS) AND 4
175 IF DM<>1THENPOKE SL,0
180 IF PK=4THENPRINT@476,"On ";E
LSEPRINT@476,"Off";
185 IF DM=1THENPRINT@508,"On ";E
LSEPRINT@508,"Off";
190 TK=PEEK(SR):PRINT@457,TK;:FO
RX= 2430TO2433:POKEX,TK:NEXT
195 Q$=INKEY$:IFQ$=""THEN430
200 Q=VAL(Q$):ON Q GOTO250,265,2
90,210,215,325,410,360,530
205 SOUND5,3:GOTO195
210 GOSUB225:GOTO165
215 IF DM=1THENDM=0 ELSEDM=1
220 GOTO165
225 GOSUB280:POKE SS,3
230 FORX=1TO60:CK=PEEK(SR)
235 PK=PEEK(SS) AND 4
240 IFCK=0 AND PK=4THENRETURN
245 NEXT:GOTO465
250 IF TK=TX THEN165
255 IF DM<>1THENGOSUB280
260 POKE SS,SI:GOTO165
265 IF TK=0THEN165
270 IF DM<>1THENGOSUB280
275 POKE SS,SO:GOTO165
280 POKE SL,CP:FORX=1TO50
285 NEXT:RETURN
290 PRINT@391,"";:LINEINPUT"Ente
r A Track ?  ";Q$:TK=VAL(Q$)
295 IF TK>TX THEN290
300 GOSUB225:IF TK=0THEN160
305 GOSUB280:FORX=1TO TK
310 POKE SS,SI
315 IF PEEK(SS)AND 1THEN315
320 NEXT:GOTO160
325 DSKI$ D1,17,3,Y$,Z$:X$=STRIN
G$(128,255):IFY$<>X$ OR Z$<>X$TH
ENPRINT@389,"Your Disk Isn't Bla
nk!":SOUND5,7:GOTO350 ELSEPRINT@
389,"40-Track Disk: <Y/N> ?":GOS
```

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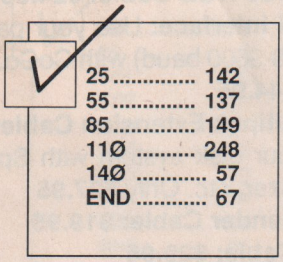
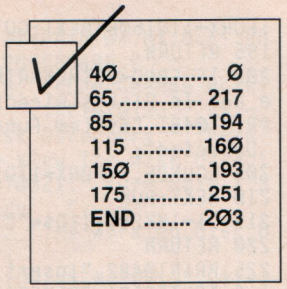
```
UB540:IFQ$<>"Y"THENTX=34
330 PRINT@389,"  Writing To Disk
  ...":IF PEEK(2439)=255THENVF=1
335 VERIFY OFF:FORX=0TO TX:PRINT
@457,X;:FORY=1TO18:DSKO$ D1,X,Y,
X$,X$:NEXTY,X
340 PRINT@391,"Read & Verifing .
..":FORX=0TO TX:PRINT@457,X;:FOR
Y=1TO18:DSKI$ D1,X,Y,Y$,Z$:IFY$=
X$ AND Z$=X$THENNEXTY,X ELSE355
345 PRINT@391,"Verify Complete .
..":SOUND100,6:GOSUB550
350 GOSUB535:GOTO110
355 GOSUB550:GOTO465
360 POKE SL,D4:PRINT@388,"Drive
Light On:  <Y/N> ?"
365 GOSUB540:IFQ$="N"THEN465
370 X=USR0(0):PRINT@387,"Does Sy
stem Work:  <Y/N> ?"
375 PRINT@449,"Slide Disk In And
 Out Of Drive";
380 PK=PEEK(SS)
385 WP= PK AND 64:IF WP<1THENPRI
NT@481," WRITE PROTECT IS NOT EN
ABLED ";ELSEPRINT@481," THE WRIT
E PROTECT IS ENABLED ";
390 Q$=INKEY$:IFQ$=""THEN380
395 IFQ$="N"THEN465
400 POKE SL,0:GOTO110
405 GOSUB540:GOTO400
410 PRINT@389,"Custom Basic:  <Y
/N> ?":GOSUB540:GOSUB280:IFQ$="Y
"THENL=5347 ELSEL=5440
415 FORK= 32001TO32036:READ D:PO
KEK,D:NEXT:Y=K:Z=Y+1:X=0:T=0:PRI
NT@389,"  Drive RPM  =":POKE235,
D1:EXEC32001:FORK=1TO43:NEXT
420 EXEC32001:P=PEEK(Y)*256+PEEK
(Z):IFP=0THEN465 ELSES=(L/P)*300
:T=T+S:X=X+1:PRINT@405,USING"###
.##";S:IF INKEY$=""THEN420
425 POKE SL,0:AV=T/X:PRINT@391,"
AVG Speed  =";:PRINT@405,USING"#
##.##";AV:GOSUB535:GOTO110
430 IF K=0THENK=1:PRINT@406,"
";ELSEK=0:PRINT@406,"...";
435 FORX=1TO50:NEXT:GOTO195
440 DATA 52,18,142,0,0,182,255
445 DATA 72,48,1,39,18,132,2,38
450 DATA 245,142,0,0,182,255,72
455 DATA 48,1,39,4,132,2,39,245
460 DATA 175,141,0,2,53,146
465 PRINT@449,"DRIVE FUNCTION ER
ROR DETECTED,  Press Any <KEY> W
hen Ready ...";:POKE &HFF40,0:SO
UND5,7:GOSUB540:GOTO110
470 PRINT@481,"System Function E
rror Detected";:SOUND5,7
475 FORX=1TO1650:NEXT:RUN
480 DF=0:PRINT@482,"Reading Your
 Disk Directory.";:DSKI$ D1,17,2
,X$,Y$:FORX=3TO9:DSKI$ D1,17,X,Y
$,Z$:FORK=1TO128 STEP32:GOSUB485
:NEXTK:Y$=Z$:FORK=1TO128 STEP32:
GOSUB485:NEXTK,X:GOTO500
485 SB$=MID$(Y$,K,14):L$=LEFT$(S
B$,1):IF ASC(SB$)>127 OR L$=CHR$
(0)THENRETURN ELSEIFL$=CHR$(255)
THEN500 ELSEDF=DF+1:Y=ASC(RIGHT$
(SB$,1))+1:FL$(DF)=LEFT$(SB$,8)+
"."+MID$(SB$,9,3)
490 GR(DF)=GR(DF)+1:Z=ASC(MID$(X
$,Y,1)):IFZ<78THENY=Z+1:GOTO490
495 RETURN
500 IFDF<1THENPRINT@482,"NO FILE
S IN DISK'S DIRECTORY";:SOUND5,7
:FORX=1TO1500:NEXT:GOTO65
505 K=1:F=FREE(D1):PALETTE12,F1:
PALETTE13,B1:CLS:PRINT@5,"<<< Di
rectory Of"D1">>>":PRINT
510 FORX=1TO DF:IFGR(X)<10THENFL
$(X)=FL$(X)+" "+STR$(GR(X))ELSEF
L$(X)=FL$(X)+STR$(GR(X))
515 IFK=1THENK=0:PRINTFL$(X)" ";
:NEXT ELSEK=1:PRINTFL$(X):NEXT
520 PRINT"Free ="F:PRINT:Q$=INKE
Y$:PRINT@482,"Press Any Key When
 Ready ...";:GOSUB540:RUN
525 PRINT@4," <<< TEST MASTER 3
>>> ";:RETURN
530 POKE &HFF40,0:RUN
535 FORX=1TO1850:NEXT:RETURN
540 Q$=INKEY$:IFQ$=""THEN540
545 RETURN
550 IFVF=1THEN VERIFYON
555 RETURN
560 PRINT@482,"Insert System Dis
k & 'ENTER'";:GOSUB540
565 IFQ$<>CHR$(13)THEN560
570 CLEAR200,32762
575 ON ERR GOTO470
580 LOAD"BOOT",R
```



Listing 6: TRAK.SYS

```
0 'DISK MASTER 3
   WRITTEN BY MIKE JORGENSON
   COPYRIGHT (C) JANUARY 1991
   BY FALSOFT, INC.
10 ' Track Master 3
15 CLEAR23275:POKE65497,0
20 X=32763:B1=PEEK(X):F1=PEEK(X+
1):K=PEEK(X+2):IP=PEEK(2394):DIM
Y$(5,18),Z$(5,18),FL$(78):F$=STR
ING$(30,128):G$=STRING$(32,191):
ONBRK GOTO15:ONERR GOTO115
25 PALETTE12,K:PALETTE13,0:CLS:P
RINTG$:PRINT@32,G$:PRINT@4," <<<
 TRACK MASTER 3 >>> ";:FORX=96TO
352 STEP32:PRINT@X,STRING$(32,17
5);:NEXT:PRINT@416,G$;
30 PRINT@129," <D>= Change Worki
ng Drive    ";:PRINT@193," <B>=
Backup The Working Disk ";:PRINT
@257," <V>= View Working Drive D
isk ";:PRINT@321," <Q>= Quit / R
eturn To Menu    ";
35 POKE65496,0:PRINT@481," The W
orking Disk Drive  = "IP;
40 GOSUB175:Q=INSTR("BVQD",Q$)+1
:ONQ GOTO40,55,120,185
45 PRINT@482,"Which Drive 0/3: <
ENTER=0> ?";:GOSUB175:D=VAL(Q$):
IFD<4THENIP=D:DRIVED
50 GOTO35
55 PRINT@130,"The Source Disk Dr
ive is: "IP;:PRINT@194,"Destinat
ion 0/3: <ENTER=0> ?";:PRINT@257
,F$;:PRINT@321,F$;:PRINT@481,"<B
REAK> = Abort Backup Routine";:G
OSUB175:OP=VAL(Q$):IFOP>3THEN30
60 PRINT@194,"The Destin Disk Dr
ive is: "OP;:PRINT@258,"Tracks:
 <F1=35>  <F2=40>  ?";:TK=35:GOS
UB175:IFQ$=CHR$(4)THENTK=40
65 PRINT@322,"Bypass Disk Errors
:  <Y/N> ?";:GOSUB175:ONERR GOTO
105:G$="":X=1:IFQ$="N"THENBY=1
70 PRINT@258,"Reading: 0  "TK"Tr
ack Backup";:PRINT@322,"Errors:
 Read = 0  Write = 0";:PRINT@481
,F$;:ER=0:EW=0:T=1:GOTO85
75 T=1:IFIP=OP THENQ$="Source":G
OSUB165
80 PRINT@258,"Read";
85 PRINT@266,TN;:POKE65496,0:FOR
S=X TO18:DSKI$ IP,TN,S,Y$(T,S),Z
$(T,S):NEXT:POKE65497,0:TN=TN+1:
T=T+1:X=1:IFT<6THEN85 ELSET=1:IF
IP=OP THENQ$="Destin":GOSUB165
90 TN=TN-5:PRINT@258,"Writ";
95 PRINT@266,TN;:POKE65496,0:FOR
S=X TO18:DSKO$ OP,TN,S,Y$(T,S),Z
$(T,S):NEXT:POKE65497,0:TN=TN+1:
T=T+1:X=1:IFT<6THEN95 ELSEFORY=1
TO5:FORZ=1TO18:Y$(Y,Z)="":Z$(Y,Z
)="":NEXTZ,Y:IFTN<TK THEN75
100 PRINT@481,"Run Same Config A
gain: <Y/N> ?";:SOUND5,7:GOSUB17
5:IFQ$="Y"THENPRINT@481,"Insert
Subject Disks & 'ENTER'";:GOSUB1
70:TN=0:GOTO70 ELSERUN
105 IFS=18 OR BY=1THEN115
110 X=S+1:IF ERLIN=85THENER=ER+1
:PRINT@337,ER;:GOTO85 ELSEIF ERL
IN=95THENEW=EW+1:PRINT@348,EW;:G
OTO95
115 PRINT@481,"System Function E
rror Detected";:SOUND5,7:FORX=1T
O1650:NEXT:RUN
120 PRINT@482,"Reading Your Disk
 Directory.";:FL=0:FORX=3TO9:DSK
I$ IP,17,X,A$,B$:GOSUB125:A$=B$:
GOSUB125:NEXTX:GOTO135
125 FORK=1TO128 STEP32:FL=FL+1:F
L$(FL)=MID$(A$,K,11):A=ASC(LEFT$
(FL$(FL),1)):IFA=0THENFL=FL-1 EL
SEIFA=255THENFL=FL-1:GOTO135
130 NEXTK:RETURN
135 IFFL<1THENPRINT@482,"NO FILE
S IN DISK'S DIRECTORY";:SOUND5,7
:FORX=1TO1500:NEXT:RUN
140 FORX=1TOFL:FL$(X)=LEFT$(FL$(
X),8)+"."+MID$(FL$(X),9,3):NEXT
145 PALETTE12,F1:PALETTE13,B1:CL
S:PRINT@5,"<<< Directory of"IP">
>>":PRINT:X=1:FORK=1TOFL
150 IFX=1THENX=0:PRINT"  "FL$(K)
"    ";ELSEX=1:PRINTFL$(K)
155 NEXT:PRINT:Q$=INKEY$
160 PRINT@482,"Press Any Key Whe
n Ready ...";:GOSUB175:RUN
165 PRINT@482,"Insert "Q$" Disk
& 'ENTER'";:SOUND5,7
170 GOSUB175:IFQ$=CHR$(13)THENPR
INT@481,F$;:RETURN ELSE170
175 Q$=INKEY$:IFQ$=""THEN175
180 RETURN
185 Q$="System":GOSUB165
190 LOAD"BOOT",R
```



Listing 7: COPY.SYS

```
0 'DISK MASTER 3
   WRITTEN BY MIKE JORGENSON
   COPYRIGHT (C) JANUARY 1991
   BY FALSOFT, INC.
10 ' Copy Master 3
15 ' Coco 3 Utility
20 ' Mike Jorgenson
25 '
30 CLEAR1500:POKE65497,0
35 DIM FL$(78),GR(78):D1=PEEK(23
94):X=32763:B1=PEEK(X):F1=PEEK(X
+1):Q=PEEK(X+2):F$=STRING$(30,12
8):G$=STRING$(32,191):H$=STRING$
(32,175):ONBRK GOTO30:ONERR GOTO
200:PALETTE12,Q:PALETTE13,0
40 CLS:PRINT@0,G$:PRINT@32,G$:PR
INT@4," <<< COPY MASTER 3 >>> ";
:PRINT@416,G$:FORX=96TO352 STEP3
2:PRINT@X,H$:NEXT:POKE65496,0
45 PRINT@129," <D>= Change Worki
ng Drive    ";:PRINT@193," <C>=
Copy Working Disk Files ";:PRINT
@257," <V>= View The Disk Direct
ory ";:PRINT@321," <Q>= Quit / R
eturn To Menu   ";:PRINT@482,"Th
e Working Disk Drive  = "D1;
50 GOSUB215:Q=INSTR("QVCD",Q$)+1
:ONQ GOTO50,225,150,65
55 PRINT@482,"Which Drive 0-3: <
ENTER=0> ? ";:GOSUB215:D=VAL(Q$)
:IFD<4THEND1=D:DRIVED
60 GOTO45
65 PRINT@129," <1>= Copy a Singl
e Disk File ";:PRINT@193," <2>=
Supercopy Several Files ";:PRINT
@257," <3>= Supercopy All The Fi
les ";:PRINT@321," <BREAK> = Abo
rt Copy Routine ";
70 PRINT@482,"Enter Your Choice
When Ready";:GOSUB215:Q=VAL(Q$):
IFQ<1 OR Q>3THEN45
75 IFQ=1THENPRINT@129," Copying
a Single Disk File   ";ELSEIFQ=2
THENPRINT@129," Supercopy Severa
l Disk Files ";ELSEPRINT@129," S
upercopy All The Disk Files ";
80 PRINT@193," The Source Disk D
rive Is: "D1;:PRINT@257," Enter
Destin Drive:  <0/3> ? ";:PRINT@
321,F$;:PRINT@482,"<BREAK> = Abo
rt Copy Routine";
85 GOSUB215:D2=VAL(Q$):IFD2>3THE
N45 ELSEPRINT@257," The Destin D
isk Drive Is: "D2;
90 D$=Q$:IFD2<1THEND$="0"
95 IFQ>1THEN100 ELSEPRINT@482,"E
nter a Filename / Extension";:PR
INT@322,"";:LINEINPUTFL$(1):PRIN
T@351,CHR$(175);:L=LEN(FL$(1)):I
FL<3 OR L>12THEN40 ELSE105
100 GOSUB170:K=0:IFDF>1THEN115
105 IFD2<>D1 THENPRINT@481,F$;:P
RINT@482,"COPYING:  "FL$(1)"  To
"D2;:COPY""+FL$(1)TO""+FL$(1)+":
"+D$:RUN
110 CLS:COPY""+FL$(1):SOUND100,6
:CLS:LINEINPUT" Insert Source Di
sk & 'ENTER' ";Q$:RUN
115 IFQ=3THEN125 ELSEPRINT@322,"
<F1> = And Copy All The Rest";:F
ORX=1TO DF:PRINT@482,"COPY:  "FL
$(X)"  <Y/N> ?";
120 Q$=INKEY$:IFQ$="Y"THENNEXT E
LSEIFQ$="N"THENFL$(X)="":NEXT EL
SEIFQ$<>CHR$(226)THEN120
125 IFD1=D2 THEN140 ELSEFORX=1TO
 DF:IFFL$(X)<>""THENK=1:PRINT@48
2,"COPYING:  "FL$(X)"  To"D2;:CO
PY""+FL$(X)TO""+FL$(X)+":"+D$
130 NEXT:IFK=1THENSOUND100,6
135 RUN
140 FORX=1TO DF:IFFL$(X)<>""THEN
CLS:COPY""+FL$(X):SOUND100,6:CLS
:LINEINPUT" Insert Source Disk &
 'ENTER' ";Q$
145 NEXT:RUN
```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- 80,40 or 32 column text displays

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Please add $3.00 Shipping & Handling 210 Bluefield Dr. Slidell, LA. 70458 COD Orders add $2.50 extra

```
15Ø GOSUB17Ø:K=1:F=FREE(D1):PALE
TTE12,F1:PALETTE13,B1:CLS:PRINT@
5,"<<< Directory Of"D1">>>"
155 PRINT:FORX=1TO DF:IFGR(X)<1Ø
THENFL$(X)=FL$(X)+" "+STR$(GR(X)
)ELSEFL$(X)=FL$(X)+STR$(GR(X))
16Ø IFK=1THENK=Ø:PRINTFL$(X)" ";
:NEXT ELSEK=1:PRINTFL$(X):NEXT
165 PRINT"Free ="F:PRINT:Q$=INKE
Y$:PRINT@482,"Press Any Key When
 Ready ...";:GOSUB215:RUN
17Ø DF=Ø:PRINT@482,"Reading Your
 Disk Directory.";:DSKI$ D1,17,2
,X$,Y$:FORX=3TO9:DSKI$ D1,17,X,Y
$,Z$:FORK=1TO128 STEP32:GOSUB175
:NEXTK:Y$=Z$:FORK=1TO128 STEP32:
GOSUB175:NEXTK,X:GOTO19Ø
175 SB$=MID$(Y$,K,14):L$=LEFT$(S
B$,1):IF ASC(SB$)>127 OR L$=CHR$
(Ø)THENRETURN ELSEIFL$=CHR$(255)
THEN19Ø ELSEDF=DF+1:Y=ASC(RIGHT$
(SB$,1))+1:FL$(DF)=LEFT$(SB$,8)+
"."+MID$(SB$,9,3)
18Ø GR(DF)=GR(DF)+1:Z=ASC(MID$(X
$,Y,1)):IFZ<78THENY=Z+1:GOTO18Ø
185 RETURN
19Ø IFDF<1THENPRINT@482,"NO FILE
S IN DISK'S DIRECTORY";:SOUND5,7
:FORX=1TO15ØØ:NEXT:GOTO45
195 RETURN
2ØØ IF ERNO=26THENPRINT@482,"Fil
e Not In Disk's Directory"; ELSE
PRINT@481,"System Function Error
 Detected";
2Ø5 SOUND5,7:FORX=1TO165Ø
21Ø NEXT:RUN
215 Q$=INKEY$:IFQ$=""THEN215
22Ø RETURN
225 PRINT@482,"Insert System Dis
k & 'ENTER'";:GOSUB215
23Ø IFQ$<>CHR$(13)THEN225
235 LOAD"BOOT",R
```

```
55 ..... 219
95 ..... 243
12Ø ..... 157
15Ø ..... 169
19Ø ..... 163
22Ø ..... 251
END ..... 22
```

Listing 8: KILL.SYS

```
Ø 'DISK MASTER 3
   WRITTEN BY MIKE JORGENSON
   COPYRIGHT (C) JANUARY 1991
   BY FALSOFT, INC.
1Ø ' Kill Master 3
15 ' Coco 3 Utility
2Ø ' Mike Jorgenson
25 '
3Ø CLEAR5ØØØ
35 DIM FL$(78),GR(78)
4Ø POKE65497,Ø:X=32763
45 D1=PEEK(2394):B1=PEEK(X)
5Ø F1=PEEK(X+1):FD=PEEK(X+2)
55 F$=STRING$(3Ø,128):G$=STRING$
(32,191):H$=STRING$(32,175):ON B
RK GOTO3Ø:ON ERR GOTO245
6Ø PALETTE12,FD:PALETTE13,Ø
65 CLS:PRINT@Ø,G$:PRINT@32,G$
7Ø PRINT@4," <<< KILL MASTER 3 >
>> ";:PRINT@416,G$
75 FORX=96TO352 STEP32
8Ø PRINT@X,H$:NEXT:POKE65496,Ø
85 PRINT@129," <D>= Change Worki
ng Drive    ";:PRINT@193," <K>=
Kill Working Disk Files ";:PRINT
@257," <V>= View The Disk Direct
ory ";:PRINT@321," <Q>= Quit / R
eturn To Menu   ";:GOSUB24Ø
9Ø GOSUB27Ø:Q=INSTR("QVKD",Q$)+1
:ONQ GOTO9Ø,28Ø,195,1Ø5
95 PRINT@482,"Which Drive Ø-3: <
ENTER=Ø> ? ";:GOSUB27Ø:D=VAL(Q$)
:IFD<4THEND1=D:DRIVE D
1ØØ GOSUB24Ø:GOTO9Ø
1Ø5 PRINT@129," <1>= Kill a Sing
le Disk File ";:PRINT@193," <2>=
 Superkill Several Files ";:PRIN
T@257," <3>= Superkill All The F
iles ";:PRINT@321," <BREAK> = Ab
ort Kill Routine ";
11Ø PRINT@482,"Enter Your Choice
 When Ready";:GOSUB27Ø:Q=VAL(Q$)
:IFQ<1 OR Q>3THEN85
115 IFQ<>1THEN195 ELSEPRINT@13Ø,
"Killing A Single Disk File  ";
12Ø PRINT@194,"Enter a Filename
/ Extension";:PRINT@257,F$;:GOSU
B24Ø:PRINT@258,"";:LINEINPUTFL$(
1):PRINT@287,CHR$(175);:L=LEN(FL
$(1)):IFL<3 OR L>12THEN75
125 PRINT@481,F$;:PRINT@482,"KIL
LING:  "FL$(1)"  On"D1;:KILL""+F
L$(1):RUN
13Ø PRINT@13Ø,"The Working Disk
Drive  = "D1;:IFQ=2THENPRINT@194
,"Superkill Several Disk Files";
 ELSEPRINT@194,"Superkill All Th
e Disk Files";:GOTO145
135 PRINT@258,"<F1> = And Kill A
ll The Rest";:FORX=1TO DF:PRINT@
482,"KILL:  "FL$(X)"  <Y/N> ?";
14Ø Q$=INKEY$:IFQ$="Y"THENNEXT E
LSEIFQ$="N"THENFL$(X)="":NEXT EL
SEIFQ$<>CHR$(226)THEN14Ø
145 PRINT@257,F$;:PRINT@481,F$;
15Ø PRINT@322,"Want To Reconside
r:  <Y/N> ?";:GOSUB27Ø
155 K=Ø:IFQ$<>"N"THEN85
16Ø FORX=1TO DF:IFFL$(X)=""THENN
EXT ELSEK=1:PRINT@481,F$;:PRINT@
482,"KILLING:  "FL$(X)"  On"D1;:
KILL""+FL$(X):NEXT
165 IFK=1THENSOUND1ØØ,6
17Ø RUN
175 K=1:F=FREE(D1):CLS:PALETTE12
,F1:PALETTE13,B1:PRINT@5,"<<< Di
rectory Of"D1">>>":PRINT
18Ø FORX=1TO DF:IFGR(X)<1ØTHENFL
$(X)=FL$(X)+" "+STR$(GR(X))ELSEF
L$(X)=FL$(X)+STR$(GR(X))
185 IFK=1THENK=Ø:PRINTFL$(X)" ";
:NEXT ELSEK=1:PRINTFL$(X):NEXT
19Ø PRINT"Free ="F:PRINT:Q$=INKE
Y$:PRINT@482,"Press Any Key When
 Ready ...";:GOSUB27Ø:RUN
195 DF=Ø:PRINT@482,"Reading Your
 Disk Directory.";
2ØØ DSKI$ D1,17,2,X$,Y$
2Ø5 FORX=3TO9:DSKI$ D1,17,X,Y$,Z
$:FORK=1TO128 STEP32:GOSUB21Ø:NE
XTK:Y$=Z$:FORK=1TO128 STEP32:GOS
UB21Ø:NEXTK,X:GOTO225
21Ø SB$=MID$(Y$,K,14):L$=LEFT$(S
B$,1):IF ASC(SB$)>127 OR L$=CHR$
(Ø)THENRETURN ELSEIFL$=CHR$(255)
THEN225 ELSEDF=DF+1:Y=ASC(RIGHT$
(SB$,1))+1:FL$(DF)=LEFT$(SB$,8)+
"."+MID$(SB$,9,3)
215 GR(DF)=GR(DF)+1:Z=ASC(MID$(X
$,Y,1)):IFZ<78THENY=Z+1:GOTO215
22Ø RETURN
225 IFDF<1THENPRINT@482,"NO FILE
S IN DISK'S DIRECTORY";:SOUND5,7
:FORX=1TO15ØØ:NEXT:GOTO85
23Ø IFQ$="V"THEN175
235 IFDF>1THEN13Ø ELSE125
24Ø PRINT@482,"The Working Disk
Drive  = "D1;:RETURN
245 IF ERNO<>26THEN255
25Ø PRINT@482,"File Not In Disk'
s Directory";:GOSUB26Ø:RUN
255 PRINT@481,"System Function E
rror Detected";:GOSUB26Ø:RUN
26Ø SOUND5,7:FORX=1TO165Ø
265 NEXT:RETURN
27Ø Q$=INKEY$:IFQ$=""THEN27Ø
275 RETURN
28Ø PRINT@482,"Insert System Dis
k & 'ENTER'";:GOSUB27Ø
285 IFQ$<>CHR$(13)THEN28Ø
29Ø LOAD"BOOT",R
```

```
6Ø ..... 2Ø6
95 ..... 226
14Ø ..... 112
19Ø ..... 127
215 ..... 228
255 ..... 244
END ..... 178
```

Listing 9: SORT.SYS

```
Ø 'DISK MASTER 3
   WRITTEN BY MIKE JORGENSON
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   BY FALSOFT, INC.
1Ø ' Sort Master 3
15 ' Coco 3 Utility
2Ø ' Mike Jorgenson
25 '
3Ø CLEAR1ØØØØ:POKE65497,Ø
35 DIMFL$(78),GR(78):X=32763
4Ø D1=PEEK(2394):B1=PEEK(X)
45 F1=PEEK(X+1):FD=PEEK(X+2)
5Ø ON BRK GOTO3Ø:ON ERR GOTO285
55 F$=STRING$(3Ø,128):G$=STRING$
(32,191):H$=STRING$(32,175)
6Ø PALETTE12,FD:PALETTE13,Ø:CLS:
PRINT@Ø,G$:PRINT@32,G$:PRINT@4,"
 <<< SORT MASTER 3 >>> ";:FORX=9
```

```
6TO352 STEP32:PRINT@X,H$:NEXT:PR
INT@416,G$:POKE65496,Ø
65 PRINT@129," <D>= Change Worki
ng Drive    ";:PRINT@193," <S>=
Sort The Disk Directory ";:PRINT
@257," <V>= View The Disk Direct
ory ";:PRINT@321," <Q>= Quit / R
eturn To Menu   ";
7Ø PRINT@482,"The Working Disk D
rive  = "D1;
75 GOSUB275:Q=INSTR("QVSD",Q$)+1
:ONQ GOTO75,295,21Ø,95
8Ø PRINT@482,"Which Drive Ø-3: <
ENTER=Ø> ? ";:GOSUB275
85 D=VAL(Q$):IFD>3THEN7Ø
9Ø D1=D:DRIVE D:GOTO7Ø
95 PRINT@129," <1>= Sort Disk By
 Filename   ";:PRINT@193," <2>=
Sort Disk By Extension  ";:PRINT
@257," <3>= Sort Disk By File Ty
pe  ";:PRINT@321," <BREAK>  =  A
bort Disk Sort  ";
1ØØ PRINT@482,"Enter Your Choice
 When Ready";:GOSUB275
1Ø5 Q=VAL(Q$):IFQ<1 ORQ>3THEN65
11Ø GOSUB255:FL=Ø:FORX=3TO9:DSKI
$ D1,17,X,Y$,Z$:GOSUB115:Y$=Z$:G
OSUB115:NEXTX:GOTO125
115 FORK=1TO128 STEP32:FL=FL+1:F
L$(FL)=MID$(Y$,K,32):A=ASC(LEFT$
(FL$(FL),1)):IFA=ØTHENFL=FL-1 EL
SEIFA=255THENFL=FL-1:GOTO125
12Ø NEXTK:RETURN
125 IFFL<1THEN26Ø
13Ø IFFL=1THEN27Ø
135 POKE65497,Ø:PRINT@482,"Sorti
ng Your Disk Directory. ";
14Ø ON Q GOTO145,16Ø,175
145 K=Ø:FORX=1TO FL:Y=X+1
15Ø IF LEFT$(FL$(X),11)>LEFT$(FL
$(Y),11)THENZ=1:K=1:X$=FL$(X):FL
$(X)=FL$(Y):FL$(Y)=X$
155 NEXT:IFK=1THEN145 ELSE19Ø
16Ø K=Ø:FORX=1TO FL:Y=X+1
165 IF MID$(FL$(X),9,3)>MID$(FL$
(Y),9,3)THENZ=1:K=1:X$=FL$(X):FL
$(X)=FL$(Y):FL$(Y)=X$
17Ø NEXT:IFK=1THEN16Ø ELSE19Ø
175 K=Ø:FORX=1TO FL:Y=X+1
18Ø IF MID$(FL$(X),12,1)>MID$(FL
$(Y),12,1)THENZ=1:K=1:X$=FL$(X):
FL$(X)=FL$(Y):FL$(Y)=X$
185 NEXT:IFK=1THEN175
19Ø POKE65496,Ø:IFZ<>1THEN27Ø
195 SC=3:X=Ø:PRINT@482,"Writing
Your Disk Directory. ";
2ØØ Y$="":Z$="":FORK=1TO4:GOSUB2
Ø5:Y$=Y$+FL$(X+K):NEXT:FORK=5TO8
:GOSUB2Ø5:Z$=Z$+FL$(X+K):NEXT:DS
KO$ D1,17,SC,Y$,Z$:SC=SC+1:X=X+8
:IFX<FL THEN2ØØ ELSERUN
2Ø5 IFFL$(X+K)=""THENFL$(X+K)=ST
RING$(32,255):RETURN ELSERETURN
21Ø GOSUB255:DF=Ø:DSKI$ D1,17,2,
X$,Y$:FORX=3TO9:DSKI$ D1,17,X,Y$
,Z$:FORK=1TO128 STEP32:GOSUB215:
NEXTK:Y$=Z$:FORK=1TO128 STEP32:G
OSUB215:NEXTK,X:GOTO23Ø
215 SB$=MID$(Y$,K,14):L$=LEFT$(S
B$,1):IF ASC(SB$)>127 OR L$=CHR$
(Ø)THENRETURN ELSEIFL$=CHR$(255)
THEN23Ø ELSEDF=DF+1:Y=ASC(RIGHT$
(SB$,1))+1:FL$(DF)=LEFT$(SB$,8)+
"."+MID$(SB$,9,3)
22Ø GR(DF)=GR(DF)+1:Z=ASC(MID$(X
$,Y,1)):IFZ<78THENY=Z+1:GOTO22Ø
225 RETURN
23Ø IFDF<1THEN26Ø
235 K=1:F=FREE(D1):PALETTE12,F1:
PALETTE13,B1:CLS:PRINT@5,"<<< Di
rectory Of"D1">>>":PRINT
24Ø FORX=1TO DF:IFGR(X)<1ØTHENFL
$(X)=FL$(X)+" "+STR$(GR(X))ELSEF
L$(X)=FL$(X)+STR$(GR(X))
245 IFK=1THENK=Ø:PRINTFL$(X)" ";
:NEXT ELSEK=1:PRINTFL$(X):NEXT
25Ø PRINT"Free ="F:PRINT:Q$=INKE
Y$:PRINT@482,"Press Any Key When
 Ready ...";:GOSUB275:RUN
255 PRINT@482,"Reading Your Disk
 Directory.";:RETURN
26Ø PRINT@482,"NO FILES IN DISK'
S DIRECTORY";:SOUND5,7
265 FORX=1TO15ØØ:NEXT:GOTO65
27Ø PRINT@482,"DISK HAS ALREADY
BEEN SORTED";:SOUND5,7:GOTO29Ø
275 Q$=INKEY$:IFQ$=""THEN275
28Ø RETURN
285 PRINT@481,"System Function E
rror Detected";:SOUND5,7
29Ø FORX=1TO165Ø:NEXT:RUN
295 PRINT@482,"Insert System Dis
k & 'ENTER'";:GOSUB275
3ØØ IFQ$<>CHR$(13)THEN295
3Ø5 LOAD"BOOT",R
```


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Border Color Change

by Andrew Bartels

Here is a simple utility that allows you to greatly enhance your CoCo 3 screen displays. With the purchase of your CoCo 3, you were amazed at all the wonderful foreground and background color combinations that are available. Now you can control the border color, too!

Border works on 40- and 80-column text screens. To use the program, enter the listing and run it. The screen automatically changes to the 40-column text screen and the border changes to black. It is very easy to change the border. Determine the number of your favorite border color (0 to 63) and poke that value into address 32720. The border color changes instantly.

If you use this program often, you can save yourself the trouble of entering `POKE 32720,x` every time you run the program. The first number in Line 12 (0) is the default border color. By converting the color number to hexadecimal and substituting it for this number, you can have your favorite border color shown upon initialization.

There are three main parts to the machine-language portion of this utility. The first portion, `INIT` in lines 150 through 190, initializes the routine that changes the border color. It trades the interrupt vector at $010D with the address of the `BORDER` routine. The original address in $010D is stored at the label `JUMP` and `INIT` returns to BASIC.

The second portion, `BORDER` in lines 230 through 270, is executed once every time an interrupt occurs, which is usually 60 times per second. When executed, this routine saves Register A on the stack and loads it with the color value stored at address 32720. This value is placed in the Border register of the GIME chip ($FF9A). Finally, Register A is restored from the stack and the routine jumps to the original interrupt vector. Thus, while `BORDER` is executed upon any interrupt, other interrupt functions can take place as they would normally occur.

Address $FF9A contains the border color displayed by the CoCo 3. To change the border color in a BASIC program, this utility can be used but is not needed. Simply poke the appropriate color value into $FF9A to achieve the desired effect. When in direct mode, the border color will not remain constant unless you regularly store the appropriate color value into $FF9A. But *Border* allows the border color change while in direct mode.

The third portion, `DONE` in lines 200 through 220, is a short routine that takes the original interrupt address located at `JUMP` and places it back into $010D. Thus, when an interrupt occurs, the CoCo 3 jumps directly to its interrupt service routine and skips the `BORDER` routine. If for some reason you need to disable the border color change, you can `EXEC &H7FDE` (the address of the `DONE` routine). To enable it again, `EXEC &H7FD1` (the address of the `INIT` routine).

Warning! Do not attempt to execute `INIT` two times consecutively. Doing so will crash your CoCo! Make sure you end the `INIT` routine with `DONE` prior to starting `INIT`.

I hope this routine enhances your CoCo 3 screen displays. You may want to note that *Border* can be used to change the border colors in any of the `HSCREEN` modes, too. Enjoy!

Listing 1: `BORDER`

```
0 '*****************************
  '*COPYRIGHT 1990 FALSOFT INC*
1 '*    BORDER COLOR CHANGE    *
2 '*        FOR COCO III       *
3 '*   BY ANDREW B. BARTELS    *
4 '*    COPYRIGHT (C) 1986     *
5 '*****************************
6 '*EXEC&H7FD1 TO ENABLE       *
7 '*EXEC&H7FDE TO DISABLE IT   *
8 '*POKE32720,X - X IS FROM    *
9 '* 0 TO 63 TO SELECT COLOR   *
10 '****************************
11 CLEAR200,&H7FCF:WIDTH40:FORX=
&H7FD0 TO &H7FF4:READA$:POKEX,VA
L("&H"+A$):NEXT
12 DATA0,BE,1,D,BF,7F,F3,8E,7F,E
5,BF,1,D,39,BE,7F,F3,BF,1,D,39,3
4,2,B6,7F,D0,B7,FF,9A,35,2,6E,9F
,7F,F3,0,0
13 EXEC&H7FD1
```

Listing 2: `BORDERA`

```
00100 *COCO III BORDER COLOR CHANGER
00110 *BY ANDREW B. BARTELS
00120 *COPYRIGHT (C) 1986
00130          ORG     $7FD0
00140 CNUM     FCB     0
00150 INIT     LDX     $10D    GET VECTOR
00160          STX     JUMP    SAVE IT FOR LATER
00170          LDX     #BORDER POINT TO ROUTINE
00180          STX     $10D    SAVE IT
00190          RTS             RETURN TO BASIC
00200 DONE     LDX     JUMP    GET PREVIOUS ADDR
00210          STX     $10D    SAVE IT
00220          RTS     RETURN
00230 BORDER   PSHS    A       SAVE A
00240          LDA     CNUM    GET VALUE
00250          STA     $FF9A   SAVE IN PIA
00260          PULS    A       GET A BACK
00270          JMP     [JUMP]  GO TO INTERRUPT SERVICE ROUTINE
00280 JUMP     FDB     0
00290          END     INIT
```

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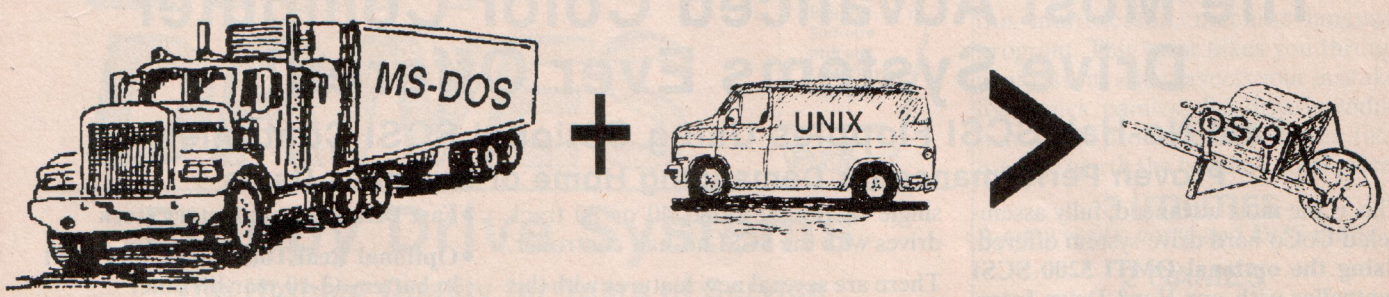

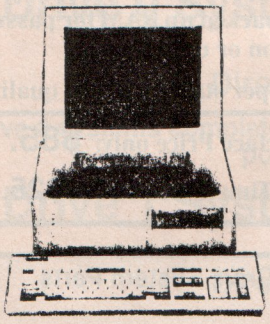

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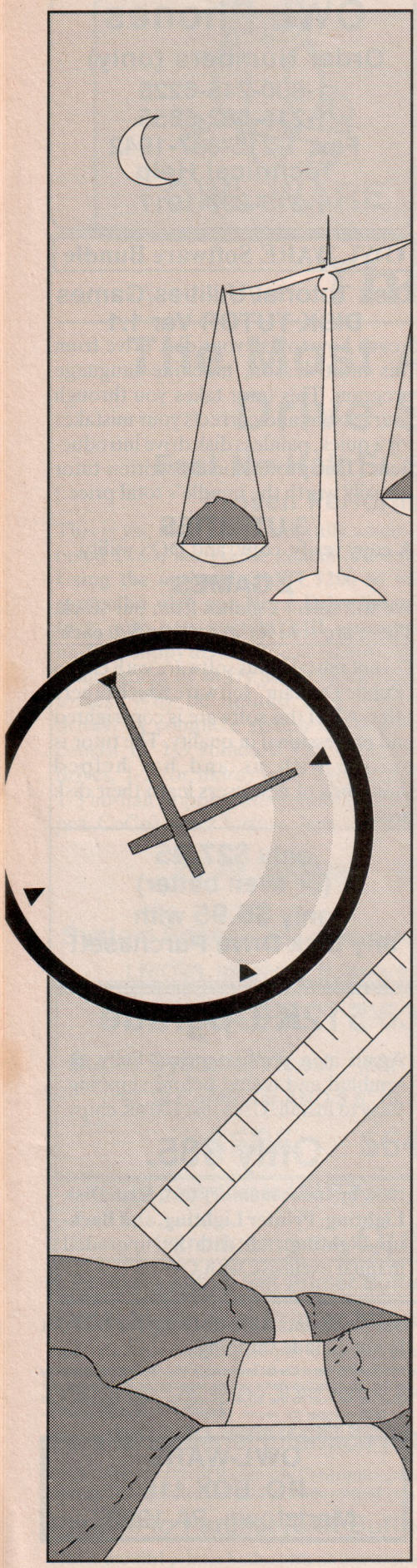


Weights & Measures

by Larry Pittman

Would you like to know your weight in stones? Your height in centimeters? Or familiarize yourself with the metric system? *Measure* allows you to quickly convert from one type of measurement to another. I would normally not use a program like this with Disk BASIC since it requires finding the disk, loading the program and returning to the original disk and program. But with OS-9, the program is always available in the CMDS directory. OS-9's multitasking and windowing capabilities allow you to simply move to another window to run the program.

The procedures included in this program are Measure, Calculate and LowUp. Measure provides all of the necessary data for the conversion calculations. Calculate performs these calculations. LowUp changes a lowercase letter to an uppercase letter.

Measure examines the data statements for the various types of measurements. I have tried to include as many common measurements in this program as possible. Measurements not useful to the average user have been omitted. This program can be customized to include constants of your own choosing.

Operation

First enter the three procedures and save the source in a data directory. Then use BASIC09's pack* command to put them all into an executable file named Measure in the CMDS directory. Also make sure runb is in your CMDS directory.

One important thing to remember is that the ESC key will not work properly unless the programs have been packed. During normal operation after the programs have been packed, pressing ESC at the Main menu causes the program to quit. Pressing ESC at any other time returns you to the Main menu.

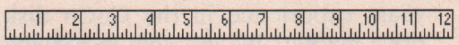
To get the program running, just enter measure at the OS9: prompt. The Main menu lists all the measurements available in the program. Options include Linear, Volume, Weight, Force, Power, wOrk, Area, Dry, Temperature, Speed and tiMe. Notice that only one letter in each option is capitalized. Press the key corresponding to that capital letter to select the desired measurement. A sub-menu within the chosen measurement category then appears on the screen. For example, pressing P brings up the Power sub-menu. This menu provides options for Watts, Horsepower, Btu/min, Ergs/sec, Kilowatts, Ft lbs/sec and bTu/hr. Once again, the capital letters represent which key to press to select the input measurement. For example, select Watts by pressing W. You are asked for the value in watts you want to convert and the units to which you want it converted. Press the appropriate capital letter and you will be given the conversion. If you press an invalid letter, a beep sounds and the program waits for a correct response.

Accuracy

Some of the values in the data statements are carried out to several decimal places. This may seem extreme, but it was done to ensure some degree of accuracy. For example, if 24 inches is the input value and feet is the output measure, the result would be displayed as 2.000 feet. The answer is displayed to four decimal places with the least significant digit accurate to plus or minus one.

Customizing

Measure can be modified to fit the needs



Larry Pittman is an electrical engineer who enjoys writing programs for his own use. He can be contacted by writing 11406 Majorca Place, Fenton MI 48430; or by calling 313-750-0047.

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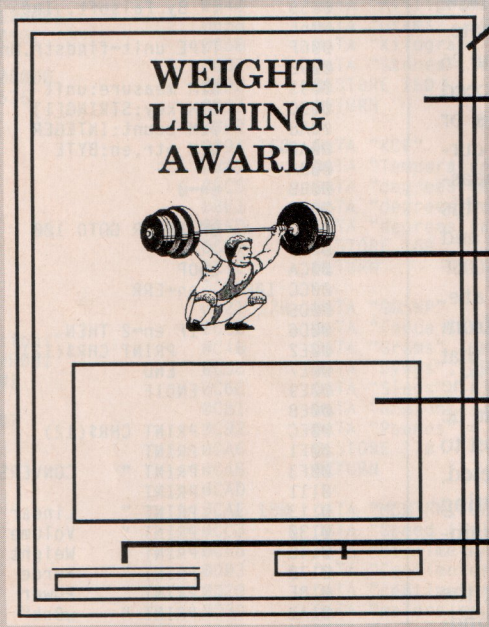

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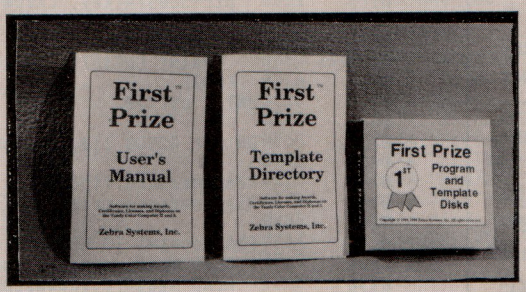

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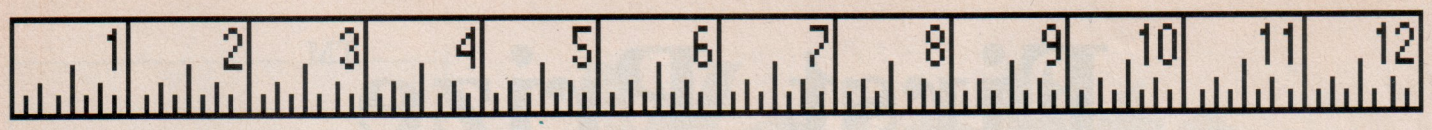


of the individual user. New measurements and even new categories can be added to the existing program.

To add to an existing category, select a unique capital letter and determine the factor for each new measurement. In the first data statement for each category is a group of seemingly random capital letters. The new capital letter must be added to this sequence in the same location as the new measurement is placed in the data statements. The obvious limit would be the 26 letters available in the alphabet. Exceed this limit and you must use numbers or other symbols. The procedures are currently set to handle a maximum of 21 measurements per category. If you exceed this limit, increase the size of arrays `name` and `value` in the `TYPE` statements at Offset $006F in `Measure` and Offset $0000 in `calculate`.

Measurements can also be deleted from the program. It is advised, however, that you leave the base measurement intact. The base measurement in each category can be identified as the one with the factor set to one. If the base measurement is deleted, choose a new base measurement by setting its factor to one and revising all the remaining factors.

The factor, the number following the measurement type, is determined by finding the number of base measurements per desired measurement. For example, examine the Linear measures data beginning in Line 110 of the `Measure` procedure. Note that the base measure is in meters since 1 is its factor. The number following every other measurement represents the number of meters in that other measurement. There are 1000 meters in a kilometer, so the number following kilometer is 1000.

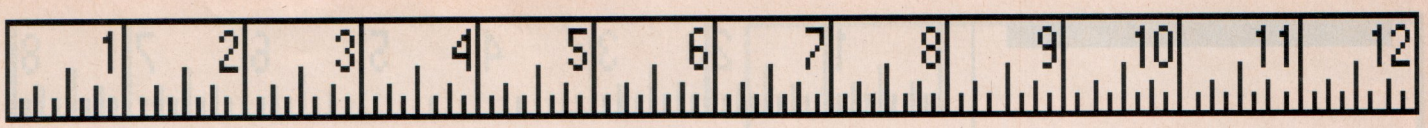
The above examples do not apply to the Temperature category since these conversions are calculated differently. I am not aware of any temperatures other than Kelvin, Centigrade and Fahrenheit.

A new category is added in much the same manner as a new measurement. First, determine a unique name and letter for the category. Modify Offset $01E5 in the `Measure` procedure to add the new letter. Add the new category name for the Main menu at Offset $01AB. Add `,220` to the end of Offset $0228. Finally add data lines at the end of `Measure`, beginning with Line 220. Use the format of the already existing `DATA` lines. Note that this represents a new subroutine and must be ended with a `RETURN` statement. ❑

OS-9 Level 2

The Listing: `Measure.b09`

```
PROCEDURE Measure
0000        (* Weights and Measures *)
001A        (* Written by Larry Pittman *)
0038        (* Copyright (c) January 1991 *)
0058        (* By Falsoft, Inc. *)
006E
006F        TYPE unit=findstr,mname,name(21):STRING; value(21):REAL
0092
0093        DIM measure:unit
009C        DIM key:STRING[1]
00A8        DIM count:INTEGER
00AF        DIM ptr,en:BYTE
00BA
00BB        en=0
00C2
00C3        ON ERROR GOTO 100
00C9
00CA        LOOP
00CC 100      en=ERR
00D5
00D6          IF en=2 THEN
00E2            PRINT CHR$(12)
00E7            END
00E9          ENDIF
00EB
00EC          PRINT CHR$(12)
00F1          PRINT
00F3          PRINT "    CONVERSIONS--MAIN MENU"
0111          PRINT
0113          PRINT "    Linear            Area"
0130          PRINT "    Volume            Dry"
014C          PRINT "    Weight            Temperature"
0170          PRINT "    Force             Speed"
018E          PRINT "    Power             tiMe"
01AB          PRINT "    wOrk"
01B7          PRINT
01B9          PRINT "Make Selection:  ";
01CF
01D0          REPEAT
01D2            GET #0,key
01DB            RUN LowUp(key)
01E5            ptr=SUBSTR(key,"LAVDWTFSPMO")
01FB
01FC            IF ptr=0 THEN
0208              PRINT CHR$(7); CHR$(8); " "; CHR$(8);
021A            ENDIF
021C          UNTIL ptr<>0
0227
0228          ON ptr GOSUB 110,120,130,140,150,160,170,180,190,200,210
025B
025C          READ measure.findstr
0265          READ measure.mname
026E
026F          FOR count=1 TO LEN(measure.findstr)
0284            READ measure.name(count)
0290            READ measure.value(count)
029C          NEXT count
02A7
02A8          RUN Calculate(measure)
02B2        ENDLOOP
02B6
02B7 110    DATA "OMCTKSIFYENRUAHL"
02D1        DATA "Linear Measure Conversions"
02F2        DATA "micrOns",.000001
0307        DATA "Millimeters",.001
0320        DATA "Centimeters",.01
0339        DATA "meTers",1
0349        DATA "Kilometers",1000
035E        DATA "milS",.0000254
0370        DATA "Inches",.0254
0384        DATA "Feet",.3048
0396        DATA "Yards",.9144
03A9        DATA "std milEs",1609.344
```



```
03C0        DATA "Naut miles",1853.2663
03D8        DATA "Rods",5.0292
03EA        DATA "fUrlongs",201.168
0400        DATA "fAthoms",1.8288
0415        DATA "cHains (surveyor)",20.116
0434        DATA "Links (surveyor)",.201168
0452        RESTORE 110
0457        RETURN
0459
045A 120    DATA "MCTKIFYEAOHR"
0470        DATA "Area Measure Conversions"
048F        DATA "square Millimeters",.000001
04AF        DATA "square Centimeters",.0001
04CF        DATA "square meTers",1
04E6        DATA "square Kilometers",1000000.
0505        DATA "square Inches",.00064516
0520        DATA "square Feet",.092903
0539        DATA "square Yards",.836127
0553        DATA "square milEs",2589990.
056D        DATA "Acres",4046.8626
0580        DATA "square rOds",25.293
0599        DATA "Hectares",10000
05AC        DATA "aRes",100
05BA        RESTORE 120
05BF        RETURN
05C1
05C2 130    DATA "MCTHFYSLIPQAEURGNDOB"
05E0        DATA "Volume Measure Conversions"
0601        DATA "cubic Millimeters",.000001
0620        DATA "cubic Centimeters",.001
063F        DATA "cubic meTers",1000
0656        DATA "cubic incHes",.01638807
0670        DATA "cubic Feet",28.32
0688        DATA "cubic Yards",254.88
06A1        DATA "milliliterS",.001
06BA        DATA "Liters",1.
06CE        DATA "gIlls",.1183
06E1        DATA "Pints",.4732
06F4        DATA "Quarts",.9463
0708        DATA "teAspoons",.0049291
071F        DATA "tablEspoons",.0147875
0738        DATA "cUps",.2366
074A        DATA "imperial quaRts",1.13649
0767        DATA "Gallons",3.7854
077C        DATA "imperial galloNs",4.54596
079A        DATA "Drams",.0036966
07AD        DATA "Ounces",.029576
07C1        DATA "Barrels",119.24
07D6        RESTORE 130
07DB        RETURN
07DD
07DE 140    DATA "PQKBLAEURHIFMCT"
07F7        DATA "Dry Measure Conversions"
0815        DATA "Pints",.5
0828        DATA "Quarts",1
0838        DATA "pecKs",8
0847        DATA "Bushels",32
0858        DATA "barreLs",104.91428
086D        DATA "teAspoons",.0052083
0884        DATA "tablEspoons",.015625
089D        DATA "cUps",.25
08AF        DATA "imperial quaRts",1.0321
08CC        DATA "imperial busHels",33.024
08EA        DATA "cubic Inches",.0148808
0904        DATA "cubic Feet",25.714022
091C        DATA "cubic Millimeters",9.0808E-07
093B        DATA "cubic Centimeters",.00090808
095A        DATA "cubic meTers",908.08
0974        RESTORE 140
0979        RETURN
097B
097C 150    DATA "IAOPHQWTLCEYURNDMGKS"
099A        DATA "Weight Conversions"
09B3        DATA "graIns",1.4285714E-04
09C7        DATA "drAms (avdp)",.00390625
09E1        DATA "Ounces (avdp)",.0625
09FC        DATA "Pounds (avdp)",1
0A13        DATA "short Hundredweight",100
0A30        DATA "Quarters",25
0A42        DATA "long hundredWeight",112
0A5E        DATA "short Tons",2000
0A73        DATA "Long tons",2240
0A87        DATA "ounCes (troy)",.0685687
0AA2        DATA "pEnnyweights",.0034284
0ABC        DATA "pounds (troY)",.8228244
0AD7        DATA "scrUples",.002857
0AED        DATA "dRams (apoth)",0.85714284E-02
0B08        DATA "ouNces (apoth)",.0685687
0B24        DATA "pounDs (apoth)",.8228562
0B40        DATA "Milligrams",2.2046E-06
0B58        DATA "Grams",.0022046
0B6B        DATA "Kilograms",2.2046
0B82        DATA "Stones",14
0B92        RESTORE 150
0B97        RETURN
0B99
0B9A 160    DATA "KCF"
0BA7        DATA "Temperature Conversions"
0BC5        DATA "degrees Kelvin",273.15
0BE1        DATA "degrees Centigrade",0
0BFD        DATA "degrees Fahrenheit",32
0C19        RESTORE 160
0C1E        RETURN
0C20
0C21 170    DATA "GDSNP"
0C30        DATA "Force Conversions"
0C48        DATA "Grams",.009803921
0C5B        DATA "Dynes",.00001
0C6E        DATA "Slugs",143.09216
0C81        DATA "Newtons",1
0C92        DATA "Pounds",4.448
0CA6        RESTORE 170
0CAB        RETURN
0CAD
0CAE 180    DATA "MCNTRKIFELO"
0CC3        DATA "Speed (Velocity) Conversions"
0CE6        DATA "Millimeters/sec",.1968504
0D03        DATA "Centimeters/sec",1.968504
0D20        DATA "ceNtimeters/min",.0328084
0D3D        DATA "meTers/sec",196.8504
0D55        DATA "meteRs/min",3.28084
0D6D        DATA "Kilometers/hr",54.6832
0D88        DATA "Inches/sec",5,"Feet/sec",60
0DAA        DATA "fEet/min",1
0DBC        DATA "miLes/hr",88
0DCE        DATA "knOts",101.33423
0DE1        RESTORE 180
0DE6        RETURN
0DE8
0DE9 190    DATA "WKHFBTE"
0DFA        DATA "Power Conversions"
0E12        DATA "Watts",1
0E21        DATA "Kilowatts",1000
0E35        DATA "Horsepower",745.7122
0E4D        DATA "Ft-lbs/sec",1.35581
0E65        DATA "Btu/min",17.58036
0E7A        DATA "bTu/hr",.293006
0E8E        DATA "Ergs/sec",.0000001
0EA4        RESTORE 190
0EA9        RETURN
0EAB
0EAC 200    DATA "WDHMSLC"
0EBD        DATA "Time Conversions"
0ED4        DATA "Weeks",168
0EE3        DATA "Days",24
0EF1        DATA "Hours",1
0F00        DATA "Minutes",.016666667
0F15        DATA "Seconds",2.77777778E-04
0F2A        DATA "miLliseconds",2.77777778E-07
0F44        DATA "miCroseconds",2.77777778E-10
0F5E        RESTORE 200
0F63        RETURN
0F65
0F66 210    DATA "JEBFKH"
0F76        DATA "Work Conversions"
0F8D        DATA "Joules",.000948
0FA1        DATA "Ergs",0.948E-10
0FB3        DATA "Btu's",1
```

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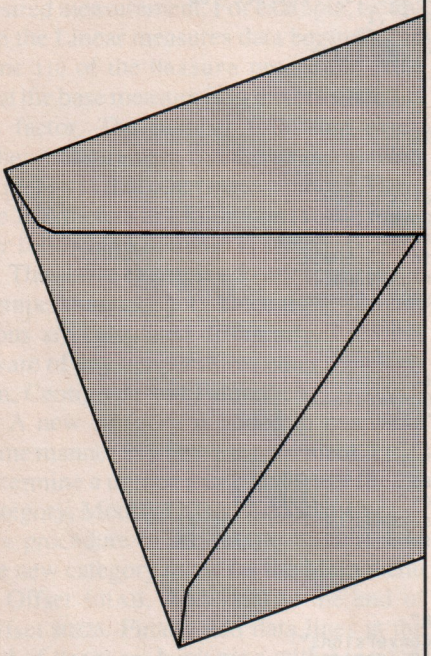

```
 ØFC2       DATA "Ft-lbs",.ØØ1286
 ØFD6       DATA "Kilowatt-hours",3415.3
 ØFF2       DATA "Horsepower-hours",2543.882
 1Ø1Ø       RESTORE 21Ø
 1Ø15       RETURN

PROCEDURE Calculate
 ØØØØ       TYPE unit=findstr,mname,name(21):STRING; value(21):REAL
 ØØ23
 ØØ24       PARAM measure:unit
 ØØ2D
 ØØ2E       DIM key:STRING[1]
 ØØ3A       DIM count:INTEGER
 ØØ41       DIM ptr,en:BYTE
 ØØ4C       DIM invalue,outvalue,factor:REAL; inname,outname:STRING
 ØØ65
 ØØ66       en=Ø
 ØØ6D
 ØØ6E       ON ERROR GOTO 1ØØ
 ØØ74
 ØØ75       LOOP
 ØØ77 1ØØ    en=ERR
 ØØ8Ø
 ØØ81         IF en=2 THEN
 ØØ8D           END
 ØØ8F         ENDIF
 ØØ91
 ØØ92         PRINT CHR$(12)
 ØØ97         PRINT
 ØØ99         PRINT "    "; measure.mname
 ØØA8         PRINT
 ØØAA
 ØØAB         FOR count=1 TO LEN(measure.findstr) STEP 2
 ØØC5           PRINT measure.name(count);
 ØØD1
 ØØD2           IF count+1<=LEN(measure.findstr) THEN
 ØØE6             PRINT TAB(22); measure.name(count+1)
 ØØF8           ELSE
 ØØFC             PRINT
 ØØFE           ENDIF
 Ø1ØØ         NEXT count
 Ø1ØB
 Ø1ØC         PRINT
 Ø1ØE         PRINT "Select Input Units:  ";
 Ø128
 Ø129         REPEAT
 Ø12B           GET #Ø,key
 Ø134           RUN LowUp(key)
 Ø13E           ptr=SUBSTR(key,measure.findstr)
 Ø14D
 Ø14E           IF ptr=Ø THEN
 Ø15A             PRINT CHR$(7); CHR$(8); " "; CHR$(8);
 Ø16C           ENDIF
 Ø16E         UNTIL ptr<>Ø
 Ø179
 Ø17A         factor=measure.value(ptr)
 Ø188         inname=measure.name(ptr)
 Ø196         PRINT
 Ø198         PRINT
 Ø19A         PRINT "Enter value in "; inname; " you wish to convert:  ";
 Ø1CC         INPUT invalue
 Ø1D1
 Ø1D2         IF measure.findstr="KCF" THEN
 Ø1E4           factor=invalue-factor
 Ø1FØ
 Ø1F1           IF ptr=3 THEN
 Ø1FD             factor=factor*5/9
 Ø2ØD           ENDIF
 Ø2ØF         ENDIF
 Ø211
 Ø212         PRINT
 Ø214         PRINT "Select Units to Convert to:  ";
 Ø236
 Ø237         REPEAT
 Ø239           GET #Ø,key
 Ø242           RUN LowUp(key)
 Ø24C           ptr=SUBSTR(key,measure.findstr)
 Ø25B
 Ø25C           IF ptr=Ø THEN
 Ø268             PRINT CHR$(7); CHR$(8); " "; CHR$(8);
```

```
027A          ENDIF
027C        UNTIL ptr<>0
0287
0288        IF measure.findstr="KCF" THEN
029A          IF ptr=1 THEN
02A6            outvalue=factor+273.15
02B5          ENDIF
02B7
02B8          IF ptr=2 THEN
02C4            outvalue=factor
02CC          ENDIF
02CE
02CF          IF ptr=3 THEN
02DB            outvalue=1.8*factor+32
02EE          ENDIF
02F0
02F1        ELSE
02F5          outvalue=factor*invalue/measure.value(ptr)
030B        ENDIF
030D
030E        outname=measure.name(ptr)
031C        PRINT CHR$(12)
0321        PRINT "    "; measure.mname
0330        PRINT
0332        PRINT
0334        PRINT "   "; invalue; " "; inname; "  =  ";
0350
0351      IF outvalue>9999 OR outvalue<.01 AND outvalue>0
          THEN
0372          PRINT USING "E12.3",outvalue;
0381        ENDIF
0383
0384        IF outvalue>=100 AND outvalue<=9999 THEN
039A          PRINT USING "R7.1",outvalue;
03A8        ENDIF
03AA
03AB        IF outvalue>=10 AND outvalue<100 THEN
03C0          PRINT USING "R7.2",outvalue;
03CE        ENDIF
03D0
03D1        IF outvalue>=1 AND outvalue<10 THEN
03E6          PRINT USING "R6.3",outvalue;
03F4        ENDIF
03F6
03F7        IF outvalue<1 AND outvalue>=.01 THEN
040F          PRINT USING "R7.4",outvalue;
041D        ENDIF
041F
0420        IF outvalue<=0 THEN
042D          PRINT USING "R8.2",outvalue;
043B        ENDIF
043D
043E        PRINT " "; outname
0447        PRINT
0449        PRINT
044B        PRINT "<ANY KEY>:  Return to "; measure.mname
046C        PRINT "<ESC>:  Return to MAIN menu"
048B        GET #0,key
0494      ENDLOOP
0498      END

PROCEDURE LowUp
0000      DIM char:BYTE
0007      PARAM answer:STRING[1]
0013
0014      char=ASC(answer)
001D
001E      IF char>96 AND char<123 THEN
0031        char=char-32
003C      ENDIF
003E
003F      answer=CHR$(char)
0048      END
```


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A Trip to the Post Office

by Steve Blyn
Contributing Editor

This article marks the 101st consecutive installment of my column. I feel I have accomplished what I set out to accomplish many years ago. As a result, this will be my final chapter.

When I purchased my original Coco in early 1981, it was touted by Radio Shack as mainly a game machine. There were those of us who knew of its other possibilities. My forté was in the field of education. I was determined to use this computer to help my children and students learn. I knew computers could present educational material in new and interesting ways.

My faith was justified. Through my software company, Computer Island Educational Software, I learned firsthand that many schools, throughout not only this country but nations worldwide, had purchased CoCos and successfully used them to further the educational process. The Network II made CoCos very economical for classroom use. Creative minds developed excellent word processors, voice synthesizers, musical programs, touch pads and video digitizers. All of these became wonderful computer adjuncts and subject material for my columns as well as instructional tools in my classroom.

The Color Computer has had the longest life in the history of personal computers. Our early competitors like the Sinclairs, Apple I's and II's, Vic 20's, Commodore 64's, PC Jr.'s and Texas Instruments have all become obsolete. The CoCo is the only one that remains compatible with its original version. This did not happen simply by chance. Much of the credit for the CoCo's longevity must go to Lonnie Falk for having the insight to create THE RAINBOW and grow with the industry.

This month's column reviews the life-skill math problem of buying multiples of stamps and postcards at a post office.

In the early years, RAINBOW was not the only Color Computer magazine. Its competitors have long since disappeared. I want to publically thank Lonnie Falk for his guidance and friendship over the years. I must also mention one other pioneer in the CoCo community. Greg Wilson was an Australian educator and businessman who met an untimely death. His early confidence in me and in the CoCo's ability to help children learn is greatly appreciated. These two men have had a positive influence on me. They always kept me thinking about what else I could do with the CoCo.

This month's column reviews the life-skill math problem of buying multiples of stamps and postcards at a post office. The program helps to review arithmetic through verbal problems. In each example, random numbers of stamps and postcards are to be purchased. The student has four individual tasks to compute in each example. The amount needed for a random number of stamps is figured, followed by the amount for a random number of postcards. Then the amounts are added. Finally, the student computes the change received from $10.

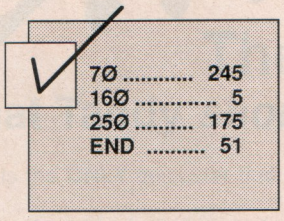
This program is suitable for middle-grade elementary students or anyone who might benefit from the arithmetic practice. The answers can be calculated mentally or with pencil and paper. Each portion of the problem must be answered correctly for the program to continue. This provides the children a way to monitor their progress. There is no limit on either the number of incorrect answers given to a problem or the time taken to successfully compute a problem. This lack of time restrictions is designed to improve the speed and accuracy of problem solving.

There are limits on the amount of 25-cent stamps and 15-cent postcards purchased in each example. These variables are on Line 50 and are as follows: Variable A is the number of stamps; Variable B is the number of postcards; Variable C is the total; and Variable D is the amount of change from a $10 bill. You can change variables A and B to modify the program's difficulty for your children.

As stated earlier, this is my final article. However, I repeat my long-standing offer for you to share any thoughts on programs, articles or educational matters with me. I have always enjoyed and appreciated your communications. And I encourage the continuation of this relationship. ❑

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

16K Extended



The Listing: MAIL

```
0 'EDUCATION NOTES
1 'WRITTEN BY STEVE BLYN
2 'PUBLISHED JANUARY 1991
10 REM"MAILING LETTERS"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1990"
30 CLEAR 1000:J=RND(-TIMER):CLS5
:LINEINPUT"SELECT ANY NAME ";N$
40 IF LEN(N$)>12 OR LEN(N$)<2 TH
EN 30
50 A=3+RND(6):B=6+RND(6):C=(A*.2
5)+(B*.15):D=10-C:P$=STRING$(32,
255)
60 CLS0:PRINT@7,"MAILING    LETT
ERS";:PRINT@32,P$;
70 PRINT@64,N$;" WENT TO THE POS
T"
80 PRINT"OFFICE TO MAIL SOME LET
TERS."
90 PRINT@160,"THE MAIL FOR THIS
TRIP WAS ..."
100 PRINT@192,A;"REGULAR LETTERS
 AND":PRINTB;"POST CARDS."
110 PRINT@128,P$;:GOSUB 280:PRIN
T@256,P$;
120 PRINT@288,"WHAT WAS THE COST
 OF";
130 GOSUB 280:PRINT@325," ":PRIN
T@325,"1. THE LETTERS?    $";
140 LINEINPUT A$:AA=VAL(A$)
150 IF INT((100*AA)+.01)=INT(A*2
5) THEN PLAY"L50CDEGG" ELSE 130
160 GOSUB 280:PRINT@355," ":PRIN
T@355,"2. THE POST CARDS?    ";
170 LINEINPUT B$:BB=VAL(B$)
180 IF INT((100*BB)+.01)=INT(B*1
5) THEN PLAY"L50CDEGG" ELSE 160
190 GOSUB 280:PRINT@385," ":PRIN
T@385,"3. THE TOTAL OF BOTH?   "
;
200 LINEINPUT C$:CC=VAL(C$)
210 IF INT((100*CC)+.01)=INT(C*1
00) THEN PLAY"L50CDEGG" ELSE 190
220 PRINT@416,P$;:GOSUB 280:PRIN
T@448," ":PRINT@448,"WHAT CHANGE
 FROM $10.00? ";
230 LINEINPUT D$:DD=VAL(D$)
240 IF INT((100*DD)+.01)=INT(D*1
00) THEN PLAY"L50CDEGG" ELSE 220
250 PRINT@484,"PRESS enter TO CO
NTINUE";
260 EN$=INKEY$
270 IF EN$=CHR$(13) THEN RUN ELS
E IF EN$="E" THEN 290 ELSE 260
280 PLAY"L802L20CDEFGAB;O3C":RET
URN
290 CLS:END
```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How Cold *is* it?

by Tony DiStefano
Contributing Editor

I came across a neat little part the other day and thought it could be used for a great project. Readers are always asking me about connecting their computer to the real world. I have done many projects, but this one is a little different. The part I saw is an LM34. At first glance, it looks like just another transistor. But, don't transistors start with 2N or something? This part number starts with an LM. When I think of LM I think of something linear like an op amp, a voltage regulator or comparator and not a transistor. Maybe this is a *voltage reference*. A voltage reference is a part that provides a very precise voltage.

For example, if you have a 2.5-volt reference it looks just like a plastic transistor. It has three pins; not a base, collector and emitter, but an input, an output and ground. The input is some voltage greater than the expected output, the output is a very precise 2.5 volts and the ground is common to all. Even if the input voltage changes, as long as it is within specs the output voltage will never change. Hence, the name *reference*. If you want to compare another voltage with this reference, you can always tell if the unknown voltage is higher or lower by using a comparator circuit.

This LM34 is much like a voltage reference, but the output voltage changes a bit. Not a very good reference, you might say. But the output voltage changes quite predictably. Most importantly, it is directly proportional to the surrounding temperature. That's right, it gives a precise way of measuring temperature. When properly connected, this device gives you a current that can be translated into a temperature reading. The specifications for the LM34 state that the output delivers 1 mA per degree Fahrenheit.

When properly connected, this device gives you a current that can be translated into a temperature reading.

Connect this device to a 100-mA meter, pencil in a scale and you have a temperature guage. This works, but you could just go out and buy a thermometer to do the same thing. This is not what I have in mind. What I want is for my CoCo to read the current and provide a digital readout. There is only one problem, the CoCo cannot read milliamps. It reads only zeros and ones. But, wait! We can use an A-to-D converter to perform the task. A-to-D means analog-to-digital. I will use one of these along with some other supporting circuitry to read the LM34. In order for a digital computer to talk to an analog device, a lot of circuitry is required. The rest of this column is dedicated to the circuitry required to read the LM34.

In the past, I have used the *SCS pin as an I/O area. This pin is mapped at $FF40 to $FF5F and is the same area that is used by the floppy-disk controller. This tends to confuse many users. Then comes the Multi-Pak Interface, which gives CoCo users four slots, each with its own switchable *SCS area. It is a simple way to have more than one I/O device connected to the CoCo. But the Multi-Pak has been discontinued and many users go the way of the Y cable. The only problem with this is that anything that uses the *SCS pin conflicts with the disk controller and will not work. But there is another way. By decoding the complete CoCo address bus, a circuit can reside in an unused area of the memory map.

Look at U1, U2A and U2B in Figure 1. These chips make up a new memory map area. U1 is a 13-input NAND gate. This means the output (Pin 9) goes Low when all of its inputs are High. U2A and U2B act as double-input inverters. When the two inputs are Low, the output goes High. So, if you study which address lines go straight into U1 and which get inverted first, you can calculate what address area causes the output of U1 to go Low. In this case the address area is $FFA8 to $FFA9. The reason the output is active for two locations is that Address Line A0 is not connected to the circuit. If A0 is High *or* Low, there is no change to the output. Since there are no devices active at either of these memory locations, there is no bus conflict and the circuit will work with just a Y cable.

If you have a device connected at this address, change the address lines from the High area to the Low. For example, if you swap A4 with A3, the address location changes to $FFB6 and $FFB7. You can change the address lines around to whatever map address you want. You have to be careful where it is mapped though. New devices

---

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's username on Delphi is DISTO.

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must be mapped to a free area in the memory map. A good knowledge of the CoCo's memory map is necessary if you want to change the circuit from what it is.

U3 is the heart of the circuit. It is an ADC0804 and is not hard to find. As you can see in Figure 1, U3 has eight data lines that connect directly to the CoCo's bus. The Chip Select line (*CS) connects to our memory map decoder. This device has two separate lines for reading (*RD) and writing (*WR). This is mainly for Intel products that have separate signals coming from the CPU. The CoCo's CPU uses one Read/Write line, so the inverter (U2C) is used to generate the required signal.

On the other side of the chip, we start at the top with VI+. This is the analog input to the device. VI- is set to ground in this circuit, but can be used as a differential input if need be. The next two pins are the CLKR and CLK inputs. The ADC0804 uses a technique known as *successive approximation* to determine the unknown input voltage. A clock input is needed to shift the data to its proper registers. This clock is controlled by the RC constant at the two clock pins. Without going into many details, the required clock signal is achieved by the values given in the diagram. The complete conversion requires 64 clock cycles. The typical clock frequency is about 640 kHz, which gives this device the ability to do about 9000 conversions per second. This is quite slow by comparison to the flash converter but is fast enough for this application. If you want more details on this ADC, look it up in the National Semiconductor Corporation *Linear Databook 2*.

The next input on the data side is VREF. When used, this Voltage Reference input pin serves as an exterior voltage reference. When not used, the internal VCC voltage is used. We'll look at this pin more closely later when we connect the LM34. The last pin is the Analog Ground signal (AGND). In this circuit it is connected to the computer's ground, but the two can be different.

To construct this circuit, use the standard tools for project building. Apart from the soldering iron and other small tools, the following parts are needed for this portion of the project:

Part Number	Part name
U1	74HC133
U2	74HC02
U3	ADC0804
R1	10K, ¼-watt resistor
C1	150pF, 25v cap
MISC	1 - 14-pin socket
	1 - 16-pin socket
	1 - 20-pin socket
	3 - .1µF, 25v cap
	1 - project board
	1 - Y cable or MPI

Remember to use the sockets when assembling the circuit. Use the three .1µF caps to decouple the power supply. These must be placed close to the sockets. Connect one side to +5 volts and the other to ground. As usual, the +5-volts and ground signals to the ICs are not marked in the diagram to keep the diagram clean. A connection list for the ICs is given below:

Part #	+5v	GND
U1	16	8
U2	14	7
U3	20	10

The two TTL ICs used in this circuit are of the HC family. If you cannot find this family, the LS family will work just as well. Remember these ICs are CMOS and require careful handling. The project board can be any CoCo-bus compatible board. The only place I know to still get them is CRC. See their ad in THE RAINBOW. When soldering in the sockets, make sure to leave space for more ICs. I see a need in the near future for expansion of this circuit.

For those interested in back issues of "Turn of the Screw" I now have a book that includes all of my columns beginning with the first one from January of 1983. The book is called *A Full Turn of the Screw* and is available from several CoCo dealers in both the United States and Canada, as well as from THE RAINBOW.

Next time, I'll finish the circuit for the LM34 and include information on how to gain access to the data from assembly language and BASIC.

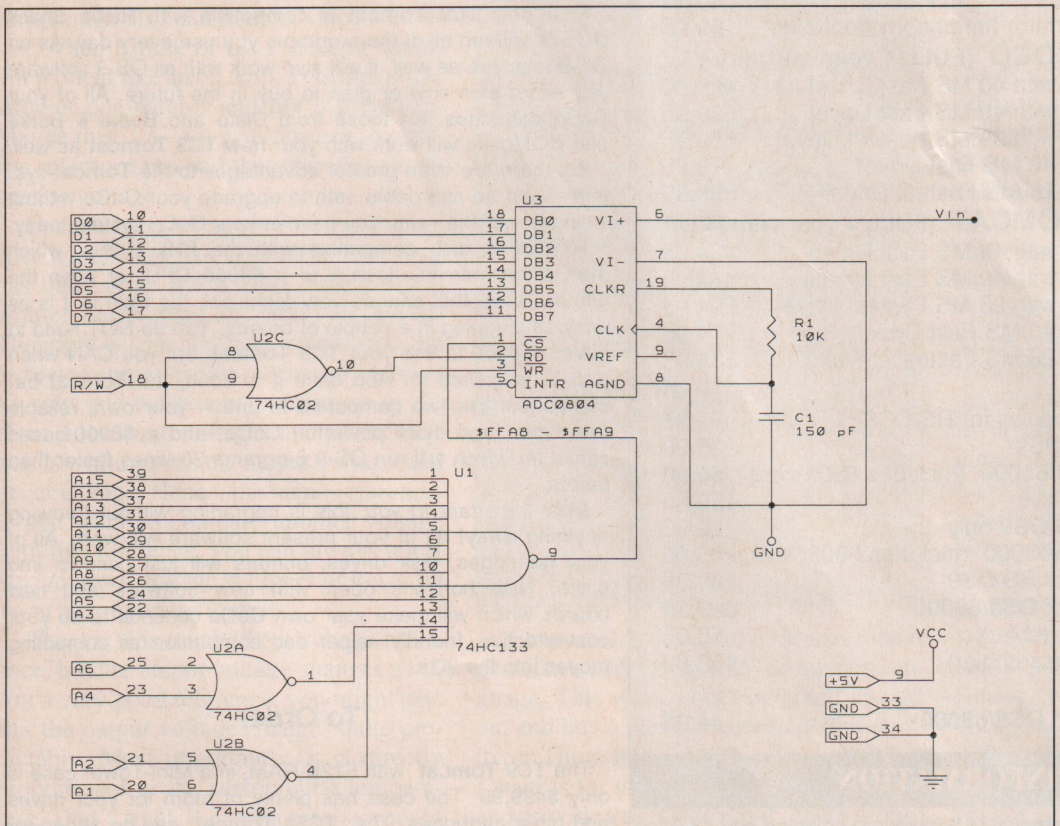

Figure 1

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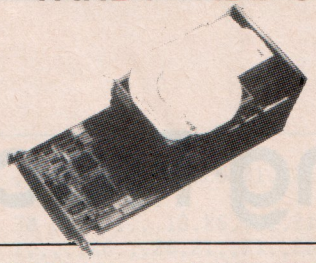

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Visualizing Fractions 2

by Fred B. Scerbo
Contributing Editor

If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*

Visualizing Fractions 1 was a special program created last year for the CoCo. The fact that the program name ended with 1 should have been an indication that a sequel would follow. Unlike most sequels, *Visualizing Fractions 2* is not an inferior copy of the original. Instead, it is the next logical step in our study of fractions. The first version of the program concentrated on simple identification of fractional parts from 1/2 to 1/9 and used the *Opposites* matrix which allows the user to use only ENTER and the space bar. *Visualizing Fractions 2* is a completely different program.

This program concentrates on the relationship between different fractional parts and uses graphics to demonstrate the concept. For example, the first program showed the relationship between the written and visual representations of the fractions, this second program shows two fractions, both written and visual, and asks if the first fraction is: A) larger than; B) equal to; or C) less than the second fraction. For the correct answer press either A, B or C. As in all our programs, pressing the @ key sends you to the score card and pressing C lets you pick up where you left off.

Another major change is the inclusion of instructions at the beginning of the program. Pressing ENTER at the title card allows for four levels of difficulty. Choose your level of play by pressing numbers 1 through 4. The instructions are then displayed on the screen. Press ENTER to start the program.

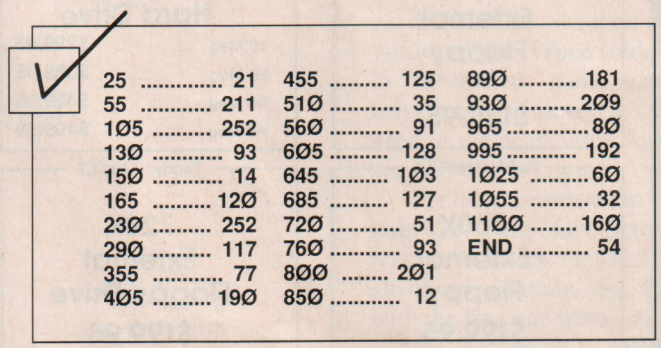
Inner Workings

There are some major changes in how this program actually works as compared to our other recent educational programs. First of all this is a quiz, not an instructional program. The student gains knowledge with this program, but this knowledge is tested and graded.

Another difference with this program is that parts of it run slower than other similar programs. This slowness is due to the use of the GET and PUT commands. Since the choice of a wrong response will invert the graphics on the screen in a flashing manner, these commands are used to create the inverted screen on a lower graphics page. This is accomplished by using the NOT switch in the PUT command. This reverses whatever we had for graphics.

These graphics were a little more difficult to draw than in its predecessor. We could not simply draw the lines of the fraction and color in one part. Instead, if we had a fraction like 4/9, we would also have to redraw in white the parts of the fraction which would be obliterated by our PAINT command. Therefore, by using two DRAW commands we are able to reinsert the miss-

32K Extended



```
25 ..... 21     455 ..... 125     89Ø ..... 181
55 ..... 211    51Ø ..... 35      93Ø ..... 2Ø9
1Ø5 ..... 252   56Ø ..... 91      965 ..... 8Ø
13Ø ..... 93    6Ø5 ..... 128     995 ..... 192
15Ø ..... 14    645 ..... 1Ø3     1Ø25 ..... 6Ø
165 ..... 12Ø   685 ..... 127     1Ø55 ..... 32
23Ø ..... 252   72Ø ..... 51      11ØØ ..... 16Ø
29Ø ..... 117   76Ø ..... 93      END ..... 54
355 ..... 77    8ØØ ..... 2Ø1
4Ø5 ..... 19Ø   85Ø ..... 12
```

The Listing: VISFRAC2

```
1 REM*****************************
2 REM* VISUALIZING FRACTIONS 2 *
3 REM* COPYRIGHT  JANUARY 1991 *
4 REM*     BY FRED B. SCERBO     *
5 REM*     6Ø HARDING AVENUE     *
6 REM*  NORTH ADAMS, MA Ø1247    *
7 REM*****************************
1Ø CLEAR3ØØØ
15 CLSØ:PRINTSTRING$(32,188);STR
ING$(32,2Ø4);:FORI=1TO 224 :READ
 A:PRINTCHR$(A+128);:NEXT
2Ø DATA29,28,28,26,3Ø,28,29,21,2
8,29,21,28,29,21,28,3Ø,29,2Ø,3Ø,
21,28,29,2Ø,3Ø,18,29,24,3Ø,29,85
,92,93
25 DATA21,,,24,26,,21,21,,21,21,
```

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

ing lines for the student to see the division in the graphics. I think you will see the effectiveness of this improvement.

Finally, we had to add the value of each fraction to our equation. The decimal values in the data statements correspond to the fractions being drawn — both 1/2 and 2/4 are represented by the value .5 in the data. With this method, the fractions can be compared to determine which is larger, smaller or if they are equal.

Conclusion

I kept this article short and to the point since there is so much typing with this listing. The length of this listing is due to the amount of drawing required.

Let me know what you think of the graphics in this program. I welcome any ideas you might have for parts 3 and 4 of this series.

See you next month.

❑

```
,20,20,,26,20,,26,21,,21,,26,26,
21,,26,,,,85
30 DATA21,,,18,26,,21,21,16,21,2
1,,,,,26,,,26,21,,21,,26,21,21,,
26,,,,85
35 DATA21,28,28,26,30,29,28,21,2
8,29,21,,,,,26,,,26,21,,21,,26,2
0,23,,28,29,85,92,92
40 DATA21,,,,26,21,,21,,21,21,,,
,,26,,,26,21,,21,,26,,31,,,21,85
,,
45 DATA21,,,,26,20,26,21,,21,21,
,21,,,26,,,26,21,,21,,26,,21,,18
,21,85,,81
50 DATA28,24,,,20,28,,,28,20,,,20,2
0,28,28,,,20,28,,,20,28,20,28,28,2
0,28,,,28,24,28,28,84,92,92
55 PRINTSTRING$(32,195);STRING$(
32,179);
60 PRINT@388," VISUALIZING FRACT
IONS 2 ";
65 PRINT@420,"    BY FRED B.SCER
BO     ";:PRINT@452,"   COPYRIGH
T (C) 1990    ";
70 X$=INKEY$:IFX$<>CHR$(13)THEN7
0
75 PRINT@452,"   SELECT LEVEL (1
-4)   ";
80 X$=INKEY$:IFX$=""THEN80
85 X=VAL(X$):IFX<=0THEN80
90 IF X>4THEN80
95 DIM A$(44),B$(44),A(44),C(400
)
100 XX=RND(-TIMER)
105 CLS:PRINT:PRINT" VISUALIZING
 FRACTIONS 2 IS A    PROGRAM DES
IGNED TO ALLOW THE   STUDENT TO
ACTUALLY SEE THE     RELATIONSHI
PS BETWEEN THE       DISPLAYED F
RACTIONS."
110 PRINT" PRESS KEYS <A>, <B>,
OR <C> TO  INDICATE IF THE 1ST F
RACTION    IS LARGER THAN, EQUAL
 TO, OR    LESS THAN THE SECOND
FRACTION.  IF YOU ANSWER CORRECT
LY, THE    CORRECT SIGN <,=, OR
> WILL BE"
115 PRINT" SHOWN. PRESS <ENTER>
FOR THE    NEXT EXAMPLE, & THE <
@> KEY TO  CHECK YOUR PROGRESS."
;
120 IFINKEY$<>CHR$(13)THEN120
125 CLS0:FORI=1TO44:READ A$(I),B
$(I):NEXT:FORI=1TO44:READ A(I):N
```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Hyper-Tech Software

MVCanvas 2.0

Finally a professional full screen editor for OS-9 Level II and Multi-Vue. MVCanvas is the only CoCo graphics editor to support multiple resolutions with up to 16 colors of 64 displayed in 320 x 200 mode with palette animation and full functional clipboard.

MVCanvas also supports multiple fonts with inverse, bold underline, and proportional options. Printer support includes: Epson, Star, C.Itoh, DMP (Tandy), with color printer supported for Star NX-1000 R, Citizen GSX-140, Tandy DMP-240 amd CGP-200, Epson LQ-2550 and compatables.

ShellMate 2.2

ShellMate is the epitome of what a point and click file management system was meant to be. With ShellMate, you have access to commands such as copy, move, delete, rename, makdir and free at the touch of a button. It also gives you point and click access to the Public Domain picture display utilities VEFShow and GIFOS9, as well as the archive utility Ar.

The biggest benefit of ShellMate is that it allows you to manipulate large batches of files with one mouse click when either copying, moving, deleting or arcing. You can also easily move through simultaneously displayed Source and Destination directory trees by either double clicking on a subdirectory name, or clicking on the "Parent" command.

System Requirements (both programs)
CoCo3, OS-9 LVL II, Multi-Vue, Disk Drive and 512k
MVCanvas $49.95
ShellMate $24.95
$3.00 S/H $2.50 C.O.D (U.S. only) Nev. res. add 6% sales tax

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Phone: (702) 362-5346

```
EXT
130 PMODE0,1:PCLS1:SCREEN0,0:LIN
E(0,0)-(255,192),PRESET,B
135 LINE(0,80)-(255,104),PRESET,
BF
140 LINE(0,168)-(255,192),PRESET
,BF
145 DRAW"BM10,88C1R4ND8R4BR4D8U4
R8U4D8BR4NR8U4NR8U4R8BR12D8U4NR8
U4R8BR4D8BR4U8R8D4L8R4F4BR4R8U4L
8U4R8BR4R4ND8R4BR12D8U4NR8U4R8BR
4ND8R8D4L8R4F4BR4U8R8D4NL8D4BR4N
R8U8R8BR4R4ND8R4BR4D8BR4NR8U8R8D
8BR4U8F8U8BR12D8BR4R8U4L8U4R8BF8
R2BR4R2BR4R2"
150 DRAW"BM20,120C0U8R8D4NL8D4BR
6E2U4H2BR18D8R6BR4U8R8D4NL8D4BR4
U8R8D4L8R4F4BR4NR8U8R8BD4NL2D4BR
4NR8U4NR8U4R8BR4ND8R8D4L8R4F4BR1
2BU8R4ND8R4BR4D8U4R8U4D8BR4U8R8D
4NL8D4BR4U8F8U8BR22BD8NR4U8R4BR1
2F4G4BR18R2U8L2"
155 DRAW"BM20,140C0R2NU8R6U4NL6U
4NL8BR6F2D4G2BR18NR8U4NR8U4R8BR4
NR8D8R8NH2NF2U8BR4D8R8U8BR4ND8R8
D4NL8D4BR4NU8R6BU8BR12R4ND8R4BR4
D8R8U8NL8BR58NR4D8R4BR10BU2R8BU4
NL8BU2BR10R4D8L4"
160 DRAW"BM20,160C0NR8U8R8BR6F2D
4G2BR18NU8R6BR4NR8U4NR8U4R8BR4NR
8D4R8D4NL8BR4R8U4L8U4R8BR12R4ND8
R4BR4D8U4R8U4D8BR4U8R8D4NL8D4BR4
U8F8U8BR46BD8NR4U8R4BR14G4F4BR14
R2U8L2"
165 DRAW"BM10,174C1R4ND8R4BR4D8U
4R8U4D8BR4NR8U4NR8U4R8BR12NR8D4R
8D4NL8BR4NR8U4NR8U4R8BR4NR8D8R8B
R4NR8U8R8D8BR4U8F8U8BR4R2ND8R8D8
NL10BR12"
170 DRAW"U4NR8U4R8BR4ND8R8D4L8R4
F4BR4U8R8D4NL8D4BR4NR8U8R8BR4R4N
D8R4BR4D8BR4NR8U8R8D8BR4U8F8U8BR
12BD8R2"
175 PCOPY1TO4
180 IF X=1 THEN LV=9
185 IF X=2 THEN LV=20
190 IF X=3 THEN LV=35
195 IF X=4 THEN LV=44
200 A=RND(LV)
205 B=RND(LV):IF B=A THEN205
210 PCOPY4TO1
215 PMODE0,1
220 CIRCLE(58,42),34,0,.9
225 DRAW"BM0,8C0"+A$(A)
230 PAINT(54,32),0,0
235 DRAW"BM0,8C1"+B$(A)
240 CIRCLE(178,42),34,0,.9
245 DRAW"BM120,8C0"+A$(B)
250 PAINT(174,32),0,0
255 DRAW"BM120,8C1"+B$(B)
260 PMODE0,1:GET(0,0)-(256,192),
C,G:PMODE0,3:PUT(0,0)-(256,192),
C,PRESET:PMODE0,1
265 SCREEN1,1
270 IF A(A)>A(B)THEN R$="A"
275 IF A(A)=A(B)THEN R$="B"
280 IF A(A)<A(B)THEN R$="C"
285 X$=INKEY$:IFX$=""THEN285
290 IFX$="A"THEN295ELSEIFX$="B"T
HEN295ELSEIFX$="C"THEN295ELSEIFX
$="@"THEN1090ELSE285
295 IFX$<>R$ THEN 380
300 PMODE0,2:PCLS1
305 CIRCLE(58,92),34,0,.9
310 DRAW"BM0,58C0"+A$(A)
315 PAINT(54,82),0,0
320 DRAW"BM0,58C1"+B$(A)
325 CIRCLE(178,92),34,0,.9
330 DRAW"BM120,58C0"+A$(B)
335 PAINT(174,82),0,0
340 DRAW"BM120,58C1"+B$(B)
345 IFR$="A"THENDRAW"BM124,82C0F
10G10R2E10H10"
350 IFR$="B"THENDRAW"BM122,90C0R
12BD4L12"
355 IFR$="C"THENDRAW"BM130,82C0G
10F10R2H10E10"
360 DRAW"BM42,30C0NR20D20R20BR6U
20R20D20NL20BR6U20R20D10L20R10F1
0BR6U20R20D10L20R10F10BR6NR20U10
NR20U10R20BR6BD20NR20U20R20BR6R1
0ND20R10":SCREEN1,1
365 IFINKEY$<>CHR$(13)THEN365
370 NC=NC+1
375 GOTO200
380 FORK=1TO4:PMODE0,3:SCREEN1,1
:FORY=1TO100:NEXTY:PMODE0,1:SCRE
EN1,1:FORY=1TO100:NEXTY,K
385 NW=NW+1
390 GOTO285
395 GOTO395
400 REM ONE HALF
405 DATA"BR58BD34NU28ND28BR44BD1
2NR8U4R8U4L8BU4L2R12L6BU4U8"
410 DATA"BR"
415 REM TWO HALVES
420 DATA"BR"
425 DATA"BR58BD34NU28ND28BR44BD1
2C0NR8U4R8U4L8BU4L2R12L6BU4R4L8U
4R8U4L8"
430 REM ONE THIRD
435 DATA"BR58BD34NU28M-26,+15M+2
6,-15M+26,+15BR20BU2R8U4NL8U4L8B
U4L2R12L6BU4U8"
440 DATA"BR"
445 REM TWO THIRDS
450 DATA"BR58BD34NU28M+26,+15BR2
0BU2R8U4NL8U4L8BU4L2R12L6BU4R4L8
U4R8U4L8"
455 DATA"BR58BD34M-26,+15"
460 REM THREE THIRDS
465 DATA"BR"
470 DATA"BR58BD34NU28M-26,+15M+2
6,-15M+26,+15BR20BU2C0R8U4NL8U4L
8BU4L2R12L6BU4L4R8U4NL8U4L8"
475 REM ONE FOURTH
480 DATA"BR58BD34NU28ND28NL32R32
BR22BD12U8D4L8U4BU4L2R12L6BU4U8"
485 DATA"BR"
490 REM TWO FOURTHS
495 DATA"BR58BD34NU28ND28R32BR22
BD12U8D4L8U4BU4L2R12L6BU4R4L8U4R
8U4L8"
500 DATA"BR58BD34L32"
505 REM THREE FOURTHS
510 DATA"BR58BD34NU28R32BR22BD12
U8D4L8U4BU4L2R12L6BU4L4R8U4NL8U4
L8"
515 DATA"BR58BD34NL32D28"
520 REM FOUR FOURTHS
525 DATA"BR"
530 DATA"BR58BD34NU28ND28NL32R32
BR22BD12C0U8D4L8U4BU4L2R12L6BU4B
R4U8D4L8U4"
535 REM ONE FIFTH
540 DATA"BR58BD34NU28M-30,-10M+3
0,+10M+30,-10M-30,+10NG22NF22BR4
6BD12R8U4L8U4NR8BU4L2R12L6BU4U8"
545 DATA"BR"
550 REM TWO FIFTHS
555 DATA"BR58BD34NU28M+30,-10M-3
0,+10NG22NF22BR46BD12R8U4L8U4NR8
BU4L2R12L6BU4R4L8U4R8U4L8"
560 DATA"BR58BD34M-30,-10"
565 REM THREE FIFTHS
570 DATA"BR58BD34NU28M+30,-10M-3
0,+10NF22BR46BD12R8U4L8U4NR8BU4L
2R12L6BU4L4R8U4NL8U4L8"
575 DATA"BR58BD34M-30,-10M+30,+1
0G22"
580 REM FOUR FIFTHS
585 DATA"BR58BD34NU28M+30,-10M-3
0,+10BR46BD12R8U4L8U4NR8BU4L2R12
L6BU4BR4U8D4L8U4"
590 DATA"BR58BD34NU28M-30,-10M+3
0,+10NG22NF22"
595 REM FIVE FIFTHS
600 DATA"BR"
605 DATA"BR58BD34NU28M-30,-10M+3
0,+10M+30,-10M-30,+10NG22NF22BR4
6BD12C0R8U4L8U4NR8BU4L2R12L6BU4L
4R8U4L8U4R8"
610 REM ONE SIXTH
615 DATA"BR58BD34NU28ND28M-26,+1
5M+52,-30M-26,15M+26,+15M-52,-30
BR70BD28NU4R8U4L8U4NR8BU4L2R12L6
BU4U8"
620 DATA"BR"
625 REM TWO SIXTHS
630 DATA"BR58BD34NU28ND28M-26,+1
5M+52,-30M-26,15M+26,+15M-26,-15
BR44BD12NU4R8U4L8U4NR8BU4L2R12L6
BU4R4L8U4R8U4L8"
635 DATA"BR58BD34M-26,-15"
640 REM THREE SIXTHS
645 DATA"BR58BD34NU28ND28M+26,-1
5M-26,15M+26,+15M-26,-15BR44BD12
NU4R8U4L8U4NR8BU4L2R12L6BU4L4R8U
4NL8U4L8"
650 DATA"BR58BD34M-26,-15M+26,+1
5M-26,+15"
655 REM FOUR SIXTHS
660 DATA"BR58BD34NU28M+26,-15M-2
6,15M+26,+15M-26,-15BR44BD12NU4R
8U4L8U4NR8BU4L2R12L6BU4BR4U8D4L8
U4"
665 DATA"BR58BD34ND28M-26,-15M+2
6,+15M-26,+15"
670 REM FIVE SIXTHS
675 DATA"BR58BD34NU28M+26,-15M-2
6,15BR44BD12NU4R8U4L8U4NR8BU4L2R
12L6BU4L4R8U4L8U4R8"
680 DATA"BR58BD34ND28M-26,-15M+2
6,+15M-26,+15M+26,-15M+26,+15"
685 REM SIX SIXTHS
690 DATA"BR"
695 DATA"BR58BD34NU28ND28M-26,+1
5M+52,-30M-26,15M+26,+15M-52,-30
BR70BD28C0NU4R8U4L8U4NR8BU4L2R12
L6BU4L4R8U4L8D4U8R8"
700 REM ONE SEVENTH
705 DATA"BR58BD34NU28M-24,-20M+2
4,+20M-30,+4M+30,-4M-16,+25M+16,
-25M+16,+25M-16,-25M+30,+4M-30,-
4M+24,-20BR28BD32U8L8ND2BU4L2R12
L6BU4U8"
710 DATA"BR"
715 REM TWO SEVENTHS
720 DATA"BR58BD34NU28M-30,+4M+30
,-4M-16,+25M+16,-25M+16,+25M-16,
-25M+30,+4M-30,-4M+24,-20BR28BD3
2U8L8ND2BU4L2R12L6BU4R4L8U4R8U4L
8"
725 DATA"BR58BD34M-24,-20"
730 REM THREE SEVENTHS
735 DATA"BR58BD34NU28M-16,+25M+1
6,-25M+16,+25M-16,-25M+30,+4M-30
,-4M+24,-20BR28BD32U8L8ND2BU4L2R
```

```
12L6BU4L4R8U4NL8U4L8"
740 DATA"BR58BD34M-24,-20M+24,+2
0M-30,+4"
745 REM FOUR SEVENTHS
750 DATA"BR58BD34NU28M+16,+25M-1
6,-25M+30,+4M-30,-4M+24,-20BR28B
D32U8L8ND2BU4L2R12L6BU4BR4U8D4L8
U4"
755 DATA"BR58BD34M-24,-20M+24,+2
0M-30,+4M+30,-4M-16,+25"
760 REM FIVE SEVENTHS
765 DATA"BR58BD34NU28M+30,+4M-30
,-4M+24,-20BR28BD32U8L8ND2BU4L2R
12L6BU4L4R8U4L8U4R8"
770 DATA"BR58BD34M-24,-20M+24,+2
0M-30,+4M+30,-4M-16,+25M+16,-25M
+16,+25"
775 REM SIX SEVENTHS
780 DATA"BR58BD34NU28M+24,-20BR2
8BD32U8L8ND2BU4L2R12L6BU4NL4R4U4
L8ND4U4R8"
785 DATA"BR58BD34M-24,-20M+24,+2
0M-30,+4M+30,-4M-16,+25M+16,-25M
+16,+25M-16,-25M+30,+4"
790 REM SEVEN SEVENTHS
795 DATA"BR"
800 DATA"BR58BD34NU28M-24,-20M+2
4,+20M-30,+4M+30,-4M-16,+25M+16,
-25M+16,+25M-16,-25M+30,+4M-30,-
4M+24,-20BR28BD32C0U8L8ND2BU4L2R
12L6BU4BR4U8L8D2"
805 REM ONE EIGHTH
810 DATA"BR58BD34NU28ND28NL32NR3
2NE22NF22NG22NH22BR44BD12NU4R8U8
D4L8U4NR8BU4L2R12L6BU4U8"
815 DATA"BR"
820 REM TWO EIGHTHS
825 DATA"BR58BD34NU28ND28NL32NR3
2NE22NF22NG22BR44BD12NU4R8U8D4L8
U4NR8BU4L2R12L6BU4R4L8U4R8U4L8"
830 DATA"BR58BD34NH22"
835 REM THREE EIGHTHS
840 DATA"BR58BD34NU28ND28NR32NE2
2NF22NG22BR44BD12NU4R8U8D4L8U4NR
8BU4L2R12L6BU4L4R8U4NL8U4L8"
845 DATA"BR58BD34NH22NL32"
850 REM FOUR EIGHTHS
855 DATA"BR58BD34NU28ND28NR32NE2
2NF22BR44BD12NU4R8U8D4L8U4NR8BU4
L2R12L6BU4BR4U8D4L8U4"
860 DATA"BR58BD34NH22NL32NG22"
865 REM FIVE EIGHTHS
870 DATA"BR58BD34NU28NR32NE22NF2
2BR44BD12NU4R8U8D4L8U4NR8BU4L2R1
2L6BU4L4R8U4L8U4R8"
875 DATA"BR58BD34NH22NL32NG22ND2
8"
880 REM SIX EIGHTHS
885 DATA"BR58BD34NU28NR32NE22BR4
4BD12NU4R8U8D4L8U4NR8BU4L2R12L6B
U4L4NU4R8U4L8U4R8"
890 DATA"BR58BD34NH22NL32NG22ND2
8NF22"
895 REM SEVEN EIGHTHS
900 DATA"BR58BD34NU28NE22BR44BD1
2NU4R8U8D4L8U4NR8BU4L2R12L6BU4BR
4U8L8D2"
905 DATA"BR58BD34NH22NL32NG22ND2
8NF22NR32"
910 REM EIGHT EIGHTHS
915 DATA"BR"
920 DATA"BR58BD34NU28ND28NL32NR3
2NE22NF22NG22NH22BR44BD12C0NU4R8
U8D4L8U4NR8BU4L2R12L6BU4L4R8U4NL
8U4L8D8"
925 REM ONE NINTH
930 DATA"BR58BD34NU28M-18,-22M+1
8,+22M-30,-6M+30,+6M-26,+15M+26,
-15M-12,+26M+12,-26M+12,+26M-12,
-26M+26,+15M-26,-15M+30,-6M-30,+
6M+18,-22BR26BD34R8U4NU4L8U4NR8B
U4L2R12L6BU4U8"
935 DATA"BR"
940 REM TWO NINTHS
945 DATA"BR58BD34NU28M-30,-6M+30
,+6M-26,+15M+26,-15M-12,+26M+12,
-26M+12,+26M-12,-26M+26,+15M-26,
-15M+30,-6M-30,+6M+18,-22BR26BD3
4R8U4NU4L8U4NR8BU4L2R12L6BU4R4L8
U4R8U4L8"
950 DATA"BR58BD34M-18,-22"
955 REM THREE NINTHS
960 DATA"BR58BD34NU28M-26,+15M+2
6,-15M-12,+26M+12,-26M+12,+26M-1
2,-26M+26,+15M-26,-15M+30,-6M-30
,+6M+18,-22BR26BD34R8U4NU4L8U4NR
8BU4L2R12L6BU4L4R8U4NL8U4L8"
965 DATA"BR58BD34M-18,-22M+18,+2
2M-30,-6"
970 REM FOUR NINTHS
975 DATA"BR58BD34NU28M-12,+26M+1
2,-26M+12,+26M-12,-26M+26,+15M-2
6,-15M+30,-6M-30,+6M+18,-22BR26B
D34R8U4NU4L8U4NR8BU4L2R12L6BU4BR
4U8D4L8U4"
980 DATA"BR58BD34M-18,-22M+18,+2
2M-30,-6M+30,+6M-26,+15"
985 REM FIVE NINTHS
990 DATA"BR58BD34NU28M+12,+26M-1
2,-26M+26,+15M-26,-15M+30,-6M-30
,+6M+18,-22BR26BD34R8U4NU4L8U4NR
8BU4L2R12L6BU4L4R8U4L8U4R8"
995 DATA "BR58BD34M-18,-22M+18,+
22M-30,-6M+30,+6M-26,+15M+26,-15
M-12,+26"
1000 REM SIX NINTHS
1005 DATA"BR58BD34NU28M+26,+15M-
26,-15M+30,-6M-30,+6M+18,-22BR26
BD34R8U4NU4L8U4NR8BU4L2R12L6BU4L
4NU4R8U4L8U4R8"
1010 DATA"BR58BD34M-18,-22M+18,+
22M-30,-6M+30,+6M-26,+15M+26,-15
M-12,+26M+12,-26M+12,+26"
1015 REM SEVEN NINTHS
1020 DATA"BR58BD34NU28M+30,-6M-3
0,+6M+18,-22BR26BD34R8U4NU4L8U4N
R8BU4L2R12L6BU4BR4U8L8D2"
1025 DATA "BR58BD34M-18,-22M+18,
+22M-30,-6M+30,+6M-26,+15M+26,-1
5M-12,+26M+12,-26M+12,+26M-12,-2
6M+26,+15"
1030 REM EIGHT NINTHS
1035 DATA"BR58BD34NU28M+18,-22BR
26BD34R8U4NU4L8U4NR8BU4L2R12L6BU
4L4R8U4NL8U4L8D8"
1040 DATA"BR58BD34M-18,-22M+18,+
22M-30,-6M+30,+6M-26,+15M+26,-15
M-12,+26M+12,-26M+12,+26M-12,-26
M+26,+15M-26,-15M+30,-6"
1045 REM NINE NINTHS
1050 DATA"BR"
1055 DATA"BR58BD34NU28M-18,-22M+
18,+22M-30,-6M+30,+6M-26,+15M+26
,-15M-12,+26M+12,-26M+12,+26M-12
,-26M+26,+15M-26,-15M+30,-6M-30,
+6M+18,-22BR26BD34C0R8U4NU4L8U4N
R8BU4L2R12L6BU4L4R8U8L8D4R8"
1060 DATA .5,1,.333,.667,1
1065 DATA .25,.5,.75,1,.2,.4,.6,
.8,1
1070 DATA .167,.333,.5,.667,.833
,1
```


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```
1075 DATA .143,.286,.429,.571,.7
14,.857,1
1080 DATA .125,.25,.375,.5,.625,
.75,.875,1
1085 DATA .111,.222,.333,.444,.5
56,.667,.778,.889,1
1090 CLS:PRINT:PRINT:PRINT
1095 PRINTTAB(3)"PROBLEMS COMPLE
TED  = "NC+NW:PRINT
1100 PRINTTAB(3)"CORRECT RESPONS
ES   = "NC:PRINT
1105 PRINTTAB(3)"INCORRECT RESPO
NSES = "NW:PRINT
1110 TR=NC+NW:IFTR=0THENTR=1
1115 SC=INT(NC/TR*100)
1120 PRINTTAB(3)"YOUR TOTAL SCOR
E    = "SC"%":PRINT
1125 PRINTTAB(3)"ANOTHER TRY (Y/
N) OR (C) ?";
1130 X$=INKEY$:IFX$=""THEN1130
1135 IFX$="Y"THEN RUN
1140 IFX$="N"THEN CLS:END
1145 IFX$="C"THEN 200
1150 GOTO1130
```

Graphics CoCo 3

Novices Niche

Coloring

by Phil Elliott, Jr.

Coloring is an HSCREEN program for the CoCo 3. Instructions are displayed when you run the program. *Coloring* draws overlapping boxes and circles on the screen. You can color and paint the randomly created shapes with the specified key commands. There are 16 colors from which to choose. See if you can create familiar images by coloring the given shapes. Most of all, have fun!

The Listing: COLORING

```
0 'COLORING
   WRITTEN BY PHIL ELLIOTT, JR.
   COPYRIGHT (C) JANUARY 1990
   BY FALSOFT, INC.
1 ONBRKGOTO29:POKE65497,0:GOSUB2
5
2 HSCREEN2:PALETTE0,0:HCLS0:GOSU
B21:HCOLOR15:FORX=1TO20:BX=RND(-
TIMER):IFRND(2)=1THENELSE4
3 A=RND(320)-1:B=RND(192)-1:A1=R
ND(320)-1:B1=RND(192)-1:HLINE(A,
B)-(A1,B1),PSET,B:GOTO5
4 A=RND(320)-1:B=RND(192)-1:R=RN
D(100):HCIRCLE(A,B),R
5 NEXT:HCOLOR0:HLINE(0,180)-(319
,191),PSET,BF:HCOLOR15:HLINE(0,0
)-(319,180),PSET,B
6 S=0:FORX=0TO15:HCOLORX:HLINE(S
,184)-(S+15,191),PSET,BF:S=S+20:
NEXT:C=4:HCOLORC:HLINE(C*20,184)
-(C*20+15,191),PSET,B:X=160:Y=96
:ZZ$=INKEY$
7 AN$=INKEY$:IFAN$=CHR$(103)THEN
9ELSEIFAN$=CHR$(4)THEN10ELSEIFAN
$=CHR$(94)ORAN$=CHR$(95)THEN11EL
SEIFAN$=CHR$(10)ORAN$=CHR$(91)TH
EN13ELSEIFAN$=CHR$(8)ORAN$=CHR$(
21)THEN15ELSEIFAN$=CHR$(9)ORAN$=
CHR$(93)THEN17ELSEIFAN$=CHR$(13)
THEN19
8 IFAN$="Q"THEN29ELSEIFAN$=" "TH
EN20ELSEGOSUB23:GOTO7
9 IFC=0THEN7ELSEC=C-1:OS=1:GOSUB
22:GOTO7
10 IFC=15THEN7ELSEC=C+1:OS=-1:GO
SUB22:GOTO7
11 IFAN$=CHR$(95)THENELSEIFY=0TH
EN7ELSEY=Y-1:GOTO7
12 IFY<10THEN7ELSEY=Y-10:GOTO7
13 IFAN$=CHR$(91)THENELSEIFY=180
THEN7ELSEY=Y+1:GOTO7
14 IFY>170THEN7ELSEY=Y+10:GOTO7
15 IFAN$=CHR$(21)THENELSEIFX=0TH
EN7ELSEX=X-1:GOTO7
16 IFX<10THEN7ELSEX=X-10:GOTO7
17 IFAN$=CHR$(93)THENELSEIFX=319
THEN7ELSEX=X+1:GOTO7
18 IFX>309THEN7ELSEX=X+10:GOTO7
19 HPAINT(X,Y),C,15:GOTO7
20 PALETTERND(15),RND(64)-1:FORD
E=1TO50:NEXT:IFINKEY$=""THEN20EL
SECMP:GOSUB21:PALETTE0,0:GOTO7
21 RESTORE:FORW=8TO15:READA:PALE
TTEW,A:NEXT:RETURN:DATA5,9,16,4,
26,44,21,32
22 HCOLOR0:HLINE((C+OS)*20,184)-
((C+OS)*20+15,191),PSET,B:HCOLOR
4:HLINE(C*20,184)-(C*20+15,191),
PSET,B:RETURN
23 P=HPOINT(X,Y):IFP=0THENK=4ELS
EK=0
24 HSET(X,Y,K):FORDE=1TO50:NEXT:
HSET(X,Y,P):FORDE=1TO50:NEXT:RET
URN
25 WIDTH40:CMP:ATTR2,0:CLS1:PRIN
T:PRINTTAB(14);:ATTR2,0,U:PRINT"
INSTRUCTIONS";:ATTR2,0:PRINT:PRI
NT
26 PRINT"   USE THE ARROW KEYS T
O MOVE THE CURSOR(THE SMALL DOT)
 ONE PIXEL AT A TIME.    PRESS <
SHIFT><ARROW KEY> TO MOVE CURSOR
 10 PIXELS AT A TIME."
27 PRINT:PRINT"   USE F1 TO MOVE
 COLOR BOX TO THE LEFT OR F2 TO
MOVE IT TO THE RIGHT.":PRINT:PRI
NT"   HIT ENTER TO PAINT THE ARE
A WHERE THECURSOR IS LOCATED WIT
H THE CURRENT      COLOR."
28 PRINT:PRINT"   HIT SPACE BAR
TO BEGIN COLOR CYCLING.HIT ANY O
THER KEY TO RETURN TO NORMAL.":P
RINT:PRINT"   PRESS Q TO QUIT":P
RINT:PRINT"HIT ENTER TO BEGIN":Z
Z$=INKEY$:EXEC44539:RETURN
29 CMP:CLS1:POKE65496,0
```

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Basic Instructions

by Dale L.Puckett
Contributing Editor

Each January we get back to the basics and welcome a new group of potential OS-9 users, those who received a new CoCo 3 for Christmas. We'll take a fresh look at OS-9 and try to eliminate some of the initial apprehension surrounding the use of OS-9 by new users.

OS-9 has earned a bad reputation within the Color Computer community over the years because many people have insisted to newcomers that the operating system is hard to use and impossible to understand. This misconception is probably due to the tremendous computing power built into OS-9. In fact, the OS-9 command set is very similar to and as easily understood as its counterpart on MS-DOS machines.

Many options come with this power; options that give you an opportunity to make various choices. Unfortunately it is easy to become overwhelmed when faced with a command providing too many choices. If this happens you may lose sight of the fact that *no action* is always an option. A professional operating system like OS-9 almost always takes a popular default action if you decide not to make a choice on a command line. At the very least, most utilities print the proper command line and the options available if you feed it something undigestible.

We'll try to make your transition from the ROM-based BASIC language built into your Color Computer to OS-9 a smooth one by comparing several OS-9 commands to similar Disk BASIC commands you may have already used. To do this, we'll tackle a few similar tasks with the two tools.

Dale L. Puckett, a freelance writer and programmer, serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. His username on Delphi is DALEP: on packet-radio, KOHYD @ N4QQ; on GEnie, D.PUCKETT2; and on CIS, 71446,736.

Fundamentals

Imagine you need to print a message on the Color Computer screen. With Disk BASIC, you can enter a simple command immediately after the computer has been turned on to perform this task. For example, entering

We'll take a fresh look at OS-9 and try to eliminate some of the initial apprehension.

```
PRINT "HELLO, I'M A COLOR
COMPUTER!"
```

makes the CoCo print the following:

```
HELLO, I'M A COLOR COMPUTER!
```

Disk BASIC is a language, and one of the verbs in that language is PRINT. Each time Disk BASIC sees the word PRINT it looks at the string of characters or variables following that word and prints it.

If you need to print the same line on your screen several times, you could type in a short program and run it.

```
10 FOR X=1 TO 10
20 PRINT "HELLO, I'M A COLOR COM
PUTER!"
30 NEXT X
```

BASIC09 is one of several computer languages that run under the OS-9 operating system. Using an advanced design, it compiles each line of your program into an intermediate code, or I-code, as you enter it. As a result BASIC09 can run your programs four to five times faster than Disk BASIC. Programs written in BASIC09 are much easier to read and understand since they do not require line numbers, and you can use long variable names that convey meaning. Reading a BASIC09 program can be compared to reading the solution to a problem written in English. For example:

```
FOR LINE:=1 TO 10
PRINT "HELLO, I'M A COLOR COM
PUTER!"
NEXT LINE
```

When you run this program, BASIC09 produces the same results on your Color Computer screen as the Disk BASIC program above. If you needed a stand-alone program, you could write the same program using the C compiler that runs under OS-9:

```
main()
{
int line;

for(line = 0; line != 10; line++)
     printf("HELLO, I'M A COLOR
     COMPUTER!\n");
}
```

Disk BASIC, BASIC09 and C are all languages. While the syntax of each language is a bit different, the resulting screen output in the examples above is the same. Each language lets you do the same job.

OS-9 is *not* a language. Rather, it is an operating system. Its many utility commands let you perform various tasks. For example, the OS-9 `echo` utility lets you emulate the first Disk BASIC `PRINT` command line above. When you execute `echo` with the same parameters, it producs a similar output. Entering

```
echo HELLO, I'M A COLOR COMPUTER
```

at the OS9: prompt prints

```
HELLO, I'M A COLOR COMPUTER
```

Notice we did not put in exclamation point (!) in the command line. An exclamation point is a special character in an OS-9 command line — it is used to set up a command pipeline. We'll show you an example of a pipeline in just a bit.

A feature of many operating systems (including OS-9) is the *procedure file* (known as a batch file in another operating system). A procedure file is a text file made up of commands. When you run such a file, the commands in it are executed just as if you had typed them directly. By repeating the above `echo` command line 10 times in a procedure file, you can simulate the Disk BASIC, BASIC09 and C programs above. However, since the OS-9 Shell, which executes procedure files, is not a complete programming language and does not include `FOR ... NEXT` loops, you will need to put the `echo` command in your procedure file 10 times.

```
build TenTimes
? load echo
? echo Hello, I'm A Color Computer
? echo Hello, I'm A Color Computer
? ...
? unlink echo
? press ENTER
```

Just type `tentimes` and press ENTER to execute the procedure file. The solution above may not be elegant, but it works. It also illustrates the point that OS-9 is not really complicated. It is simply an alternative way to perform a job.

OS-9 Does Graphics!

OS-9 also lets you create graphics. To illustrate, we'll look at three ways to draw a box on the CoCo graphics screen. We'll use Disk BASIC first.

```
10 PMODE 1,1
20 PCLS
30 SCREEN 1,1
40 LINE (10,10)-(10,176),PSET
50 LINE (10,176)-(240,176),PSET
60 LINE (240,176)-(240,10),PSET
70 LINE (240,10)-(10,10),PSET
80 GOTO 80
```

Alternatively we could have replaced lines 40 though 70 with Line 40 below. But, we wanted to keep our example programs parallel.

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```
40 LINE (0,0)-(255,191),PSET,B
```

To draw the same box on a CoCo 1 or 2 with BASIC09 running under Level I, use:

```
run gfx("clear")
run gfx("color",7)
run gfx("move",16,16)
run gfx("line",16,176)
run gfx("line",240,176)
run gfx("line",240,16)
run gfx("line",16,16)
```

The above commands work on the graphics screen supported by OS-9 Level I. To run the sequence with OS-9 Level II windows on a Color Computer 3, use the line commands built into the handy `gfx2` module that comes with BASIC09. You can use the above `gfx` commands under OS-9 Level II, but you must be working in a *hardware* or Type 1 window. Note that when you work with OS-9 Level II's graphics windows, as opposed to text windows, the `grfint` module must be in your OS9Boot file. Never fear, stock OS-9 Level II comes built this way. If you have *Multi-Vue* and a little experience, you can gain better and more powerful access to graphics windows through the `windint` module supplied with *Multi-Vue*.

The `gfx` in the BASIC09 program lines above is the name of a BASIC09 module that interprets the high-level language parameters within parenthesis and sends the proper control codes to the OS-9 screen driver. The `move` command places OS-9's invisible graphics cursor at a position 16 pixels from the bottom of the screen and 16 pixels to the right of the screen's left edge.

The description of the `gfx` module above implies that you should be able to send these codes to the screen driver module from the OS-9 command line, which is true. In fact, an easy way to draw the box is to build a procedure file using the OS-9 `display` command.

```
build box
? load display
? display F 0 4
? display 10 4
? display 11 7
? display 15 10 10
? display 16 10 B0
? display 16 F0 B0
? display 16 F0 10
? display 16 10 10
? unlink display
? press ENTER
```

Again, because of the commands it uses, this procedure file must be used in a Type 1 window. You can also type `display` followed by each of the hexadecimal numbers in one command line. In fact, it's much easier to do that way.

```
display F 0 4 10 4 11 7 15 10 10
16 10 B0 16 F0 B0 16 F0 10 16 10
10
```

We formatted the procedure file in such a way as to make it parallel in structure to the BASIC09 program. The line with `display 15 10 10` places the invisible cursor used by the OS-9 graphics driver 16 pixels up and 16 pixels to the right of the lower left corner of the OS-9 graphics screen just like the move command in the BASIC09 program. Notice also that the OS-9 display command uses hexadecimal numbers while the BASIC09 program used decimal numbers. Location `B0` is 176 pixels up from the bottom of the screen. Location `F0` is 240 pixels to the right of the left edge of the screen. Notice how these numbers compare to the decimal numbers in the BASIC09 and Disk BASIC programs.

You can also use the OS-9 `display` utility with the proper control codes to move the graphics cursor, set individual pixels on the screen to a specific color, draw circles and paint an area of the screen with a specific color. While running under OS-9 Level II, you can even use them to open and close windows, create menus, and more.

Since you now understand that OS-9 ms merely another way to give directions to your CoCo, we'll show you how to get started using OS-9. Hopefully, we can steer you past a few trouble spots along the way.

OS-9 is an Operating System

Before moving on, we should take a few moments to talk about operating systems. In the language of a systems designer, an operating system controls the low-level processes within your computer. It gives applications programs a way to talk with and control your hardware. It also manages the memory and other finite resources within your computer.

These *processes* are nothing more than short programs that run and perform important jobs for you. These jobs may include putting characters in a disk file or sending a series of characters to a printer. Your system resources include external devices like your terminal, printer and disk drives. They also include objects inside your computer like memory and the microprocessor's time.

Think of an operating system as a traffic cop on a busy corner. The traffic cop directs the flow of automobiles on a busy street. OS-9 directs the flow of information inside your computer, making sure that the right data gets to the right place at the right time.

Getting Started with OS-9

To bring OS-9 to life on your Color Computer, insert your OS-9 master disk in Drive 0 and enter `DOS`. `DOS` is a Disk BASIC command that loads the OS-9 Kernel and starts the system.

Soon after you enter `DOS`, OS-9 asks you to tell it the date and time. (Add one of the many hardware clocks to your CoCo, if you have not already done so.) OS-9 uses the date and time to record when it saves a file. `setime`, the OS-9 utility that asked you for the time, must be run each time you start OS-9. This program starts the software clock that runs within OS-9. If this clock is not running, OS-9 will not be able to run multiple tasks. If you want to know the current date while running OS-9, ask for it by using the `date` utility that comes with the system. Simply type `date` and press ENTER. OS-9 will print the date on your screen. If you also need to know the time, ask OS-9 to print it, too, by adding the `t` option. Enter `date t`.

If you type this command right after you start the system, OS-9 looks in its *module directory* (a fancy phrase for *memory*) for a module named `date`. Since you haven't loaded that module, OS-9 will not find it. But OS-9 knows other places to look — it now looks for `date` in its current execution directory (almost always `/dd/CMDS` on standard OS-9 systems). If you haven't deleted the `date` command from your disk, OS-9 will find it, load it into memory and execute it — it does this behind the scenes and in just a few seconds. All you see is the date appear on the screen.

If you know you are going to use `date` several times in a session, load it into memory by entering `load date`. After this, it will appear to run instantly. In fact, you can load a number of program modules into memory and have them instantly available. But, if you try to load too many programs into the crowded 64K work space, you quickly run into problems. There won't be enough memory in your computer to run the large programs that conduct most of your real work. For example, BASIC09 takes up approximately 22K of memory. This means you have to write programs in a number of small modules, loading each module from a disk when needed. The modular structure of BASIC09 is a big plus, but loading a module from disk every time it's needed can be a big pain.

OS-9 Level II and Memory Problems

If you own a 512K CoCo 3, OS-9 Level II

will make your life much easier. It solves many of your memory problems by setting up a separate 64K of work space for each task running on the computer. Let's briefly compare OS-9 Level I and OS-9 Level II.

OS-9 Level I provides no memory management function beyond the 6809E processor's 64K address space. This limits your access to the 64K maximum.

OS-9 Level II works with two different types of work space. It sets aside a system work space that holds all of the device descriptors and device drivers that control the hardware, as well as the file managers, Kernel and other internals to manage your computer's resources. That same system work space is used for all of the data memory needed by OS-9.

After setting up its own system work space, OS-9 Level II sets up a separate work space for each process. Remember, a process is simply a running program. Each of these "user" work spaces can be up to 64K long.

When you run BASIC09 on your CoCo under OS-9 Level I, memory space is cramped and you have very little room for your own programs. For example, on my older Level I system I have 145 pages or just over 36K of free memory immediately after OS-9 starts. After BASIC09 is loaded, there are only 55 left (just over 13K). That doesn't leave much space to work.

Now, let's see what happens when you run BASIC09 with OS-9 Level II. After BASIC09 is loaded, it just sits in memory. It will be available almost immediately, but it won't be using any data work space until you start it as a process by running it from the command line. When you do this, you have nearly 64K available for it and its programs. This means BASIC09 is able to use almost 64K, 22K for itself and nearly 42K for its programs and data. Actually, there is closer to 63.5K available in each workspace since the top 512 memory locations are mapped to the hardware.

Making a New OS-9 Disk

One of the most important lessons when first working with OS-9 is to always work with a copy of the master disk from Tandy. Never work with the original disk. Accidents happen, even to experienced hackers.

Make a backup of your master disk the first time you run OS-9. It isn't difficult and shouldn't take much time. Think of it as an investment.

First, you will need to format a new disk. Enter `load format free` to load `format` and `free` into memory. Now, take the OS-9 System Master disk out of Drive `/d0` and insert the new disk. Type `format /d0` and press ENTER. `format` asks you if you really want to format the disk in Drive `/d0`. After you confirm that the disk in Drive `/d0` is indeed your new disk and not your System Master disk, press Y for Yes and the program goes to work.

You are then asked to name the new disk. You can make up any name since that name will be replaced when you backup the System Master disk on the new disk. After you enter the name, `format` verifies the data placed on the new disk.

When you see the OS9: prompt again, enter `free /d0`. The `free` command should report that a total of 630 sectors are on the disk and 620 sectors are available for use. If `format` finds any bad sectors on the new disk, it locks them out, and `free` reports a number smaller than 630. If this happens, do not attempt to backup your System Master disk to the new disk. The OS-9 `backup` utility requires that the format of the new disk be exactly like the original disk. If the two formats are not identical, `backup` will not work.

If your new disk is good, remove it and put the System Master disk back in `/d0`.

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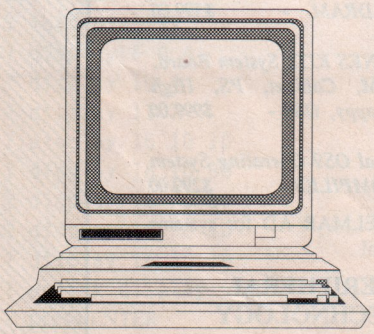

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Enter `unlink format free` to remove `format` and `free` from memory. Now enter `load backup` to load the `backup` command into memory. After the command has loaded, take the original master disk out of the drive and put in the newly formatted disk. Then enter:

```
backup -s /d0 #32K
```

When you are asked if you are ready to backup from `/d0` to `/d0`, press Y for Yes. The program then instructs you to put the destination disk in the drive and press any key. OS-9 then asks if it is all right to write over (scratch) the disk mounted in the drive. Again, press Y for Yes.

You'll then be asked to get the source disk ready. Remove the new disk from Drive `/d0`, insert the System Master disk and press any key. You will have to repeat this several times, swapping the disks until the original disk is completely copied to the new disk. If you have two disk drives in your system, you will be able to run backup by putting the fresh disk in Drive `/d0`, the System Master in Drive `/d1` and entering:

```
backup #32K /d1 /d0
```

Now that you have a new copy of your system master disk, store the original in a safe place. The important thing to remember about backups is that you can only backup a disk to another disk of identical size. You cannot backup a 35-track disk to a 40-track drive. Nor can you backup a single-sided 40-track disk to a double-sided 40-track disk.

To backup all the files on a disk of one format onto a disk formatted differently, use the OS-9 `dsave` command. Here is a series of commands that will do the job:

```
chd /d1
dsave /d1 /d0 ! shell
```

Notice that these commands assume you have two disk drives. After you have used OS-9 a few hours, you will discover that two disk drives are pretty much a necessity and not a luxury. The exclamation point in the command line causes OS-9 to send the output of the `dsave` command to the command interpreter, which is named `shell`. This is an example of the pipelines mentioned earlier.

Customizing Your Disks

One of the most important advantages of OS-9 is that it allows you to customize your system. Unfortunately, this also makes a tremendous contribution to the myth that OS-9 is difficult to use and understand.

Pledge to stick with the basics until you are ready to start modifying your system. Practice running the utility commands that are stored in the `/d0/CMDS` directory of your working system disk. Follow the directions in the OS-9 manuals and/or *The Complete RAINBOW Guide to OS-9*. After you understand what is happening with each command, move forward and modify your system.

Many of the problems encountered with OS-9 Level I revolve around the severe memory constraints forced by the limited 64K workspace. In fact, many of the error messages received happen because there is simply not enough free memory to load programs you want.

Another common error message for the beginner is Error 216, File Not Found. This error pops up for beginners since they do not fully understand the OS-9 file system.

The important thing to remember is that OS-9 always maintains two working directories. One of these directories is called the current execution directory. The other is called the current data (working) directory. OS-9 always looks in the current execution directory for the executable programs it needs. It usually stores all data files and looks for procedure files in the current data directory.

Here's the trick. The current execution directory and current data directory are seldom stored in the same physical position on two different disks. This means that even though these directories may have the same names on both disks, they are often not located on the same track or sector. Therefore, OS-9 may not be able to find your current directories if you swap the disk without telling it.

Here's the solution. If you remove one disk from a drive and insert another, type:

```
chd /d0/yourdirectory
chx /d0/cmds
```

Note that the directory names in the two command lines above are simply examples — you need to type the names of actual directories stored on the disk.

Hopefully, we have given you enough information to get you started with OS-9, and pointed out a few of the pitfalls. Hang in there and practice. Stick with the simple utilities until you thoroughly understand what is happening. After you conquer a command, move on to another. Soon, you'll be able to control your Color Computer with OS-9, and you won't feel like it's controlling you.

Until February, keep on hacking!

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The C Zen Continues

by Greg Law
Technical Editor

The first stop on our journey is a tour of the *unbuffered I/O* functions, which are also referred to as *low-level I/O* functions. These functions are referred to as low-level since they pass arguments directly to the operating system without any intermediate steps. All of the low-level functions are described in Chapter 3 of the C Compiler Manual.

Before data can be written to or read from a file, the file must be created and/or opened. As demonstrated last month, an existing file is opened by calling `open()`, but this returns an error message if the file does not already exist. In this case, the file can be created by using `creat()`. Although both functions use the same parameters, there is one distinct difference between them. With `open()`, the access mode is specified. That is, to read and/or write data to the file. In the call to `creat()`, the file permission attributes are specified. The permission attributes are

S_ISHARE	Non-Sharable
S_IOEXEC	Public Execute
S_IOWRITE	Public Write
S_IOREAD	Public Read
S_IEXEC	Owner Execute
S_IWRITE	Owner Write
S_IREAD	Owner Read

If a file is created with Owner Execute and/or Public Execute permission, it is created in the current execution directory.

To create a file with Owner Read and Owner Write permissions, use:

```
creat("datafile.dat", S_IREAD |
S_IWRITE);
```

All of the legal access permissions are defined in the `modes.h` file and are listed on Page 3-11 of the C Compiler Manual. For example, assume we are writing an application that needs to rewrite an existing file or create a new one. As shown in Listing 1, this technique is actually quite simple. First, the program tries to open the file in write mode (`S_IWRITE`). If the file cannot be opened, the program attempts to create it with Owner Read (`S_IREAD`) and Owner Write (`S_IWRITE`) attributes. If the file cannot be opened or created, the program exits with an error. If all goes well, the file is closed by calling the `close()` function and the program exits without an error.

Another method to determine the existence of a file is the `access()` function. This function works exactly like the `open()` function with one minor difference: `access()` attempts to open the file and returns a value to indicate success or failure. The file is closed if it was successfully opened and a value of 0 is returned. Otherwise a value of -1 is returned. An example of using `access()` is shown in Listing 2. If the file exists, it is opened using the `open()` function. Otherwise the program exits with an error. You would normally include the desired access mode to determine whether or not the attributes allow reading and/or writing data to the file. You can also use an access mode of zero to determine whether or not the file exists at all.

OS-9

Listing 1: `test_1.c`

```
/* BreakPoint
 * Written by Greg Law
 * Published January 1991
 */

#include <modes.h>
#include <stdio.h>

main()
{
     int  path;

     if((path = open("datafile.dat", S_IWRITE)) == -1)
          if((path = creat("datafile.dat", S_IREAD | S_IWRITE)) == -1)
               exit(errno);

     close(path);
}
```

In addition to being OS-9 Online SIGop, Greg Law enjoys programming on all types of computers and has worked on systems ranging from the CoCo to the Burroughs B6700 super mainframe. He lives in Louisville, Kentucky.

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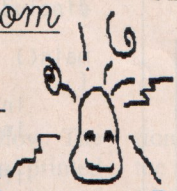
Mental Freedom



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Visa, MC, COD, Check

One commonly asked question is on the use of `access()` as opposed to simply creating or opening the file. Indeed, using `access()` may seem redundant in most cases. For example, if you are writing a terminal program with the Xmodem file transfer protocol it should be obvious that you don't want to overwrite existing files. Examine Listing 3 as I describe the actions taken by the program.

Before data can be written to or read from a file, the file must be created and/or opened.

The three integer variables are used to hold the status returned from `access()`, the path number of the newly created file and the length of the filename. The two character arrays are used to store the filename and an odd-looking thing I call an extension. The brunt of the work is performed by the `while` loop. It first checks to see if the file exists. If the file exists, the original filename is restored by terminating it with a null character and an extension is concatenated onto the chosen filename. Finally the character used for the extension is incremented and the loop checks to see if this new filename exists.

Notice that in the first pass through the loop, the program checks the existence of a file named `datafile.dat`. In the second pass through the loop, the filename is changed to `datafile.dat_a` and then to `datafile.dat_b` in the third pass through the loop. This process continues until the filename finally reaches `datafile.dat_z`. If all 27 files exist, the `exit()` function is called to terminate the program. Feel free to modify and use this routine as you choose. ❑

Listing 2: `test_2.c`

```
/* Breakpoint
 * Written by Greg Law
 * Published January 1991
 */

#include <modes.h>
#include <stdio.h>

main()
{
     int  status;
     int  path;

     if((status = access("datafile.dat", S_IREAD | S_IWRITE)) != -1)
          path = open("datafile.dat", S_IREAD | S_IWRITE);
     else
          exit(errno);

     close(path);
}
```

Listing 3: `test_3.c`

```
/* BreakPoint
 * Written by Greg Law
 * Published January 1991
 */

#include <modes.h>
#include <stdio.h>
#include <string.h>

main()
{
     int  status;
     int  path;
     int  length;
     char filename[29];
     char extension[3];

     strcpy(filename, "datafile.dat");
     strcpy(extension, "_a");
     length = strlen(filename);

     while((status = access(filename, 0)) != -1)
     {
          filename[length] = '\0';
          strcat(filename, extension);

          printf("Attempting <%s>\n", filename);

          if((extension[1]++) > 'z')
               exit(0);
     }

     path = creat(filename, S_IREAD | S_IWRITE);
     close(path);
}
```

Novices Niche

Directory Alphabetizer

by Shawn M. Davis

Directory Alphabetizer arranges all filenames in a disk directory in alphabetical order. The program is very easy to use. First, type in the listing and save it as DIRECTOR. Next, enter RUN"DIRECTOR". When the program prompts you, put the disk to be sorted in Drive 0 and press ENTER. When the sort is finished, you are asked if you want to sort another disk. Simply press Y for Yes or N for No.

The program is easy to follow. The title screen and instructions are printed from lines 20 to 40. Lines 50 to 110 read into memory a sector from the disk directory. Line 70 checks if the sector is empty. If it is, control is passed to Line 120, otherwise the filenames are placed in an array for alphabetizing. Next, lines 120 to 160 remove all filenames that have been killed, this is necessary for alphabetization. Lines 170 to 260 actually alphabetize the array of filenames. The alphabetized filenames are then placed back on the disk in lines 270 to 350. And finally, the program asks if another disk is to be alphabetized, waits for a response, and does the appropriate function in lines 360 to 410.

The Listing: DIRALPHA

```
0 '<><><><><><><><><><><><><><><><>
1 '<  DIRECTORY ALPHABETIZER  >
2 '<     BY SHAWN M DAVIS     >
3 '<    (C) COPYRIGHT 1987    >
4 '<><><><><><><><><><><><><><><><>
5 'COPYRIGHT 1990 FALSOFT, INC.
10 CLEAR 5000: DIM P$(40): M=1
20 CLS:PRINT STRING$(32,131);:PR
INT TAB(5)"DIRECTORY ALPHABETIZE
R":PRINT TAB(8)"BY SHAWN M DAVIS
":PRINT TAB(7)"(C) COPYRIGHT 198
7":PRINTSTRING$(32,140);
30 PRINT"   PLACE THE DESIRED DI
SK INTO":PRINT"    THE DRIVE AND
 PRESS ENTER":LINE INPUT K$
40 PRINT"   THE DIRECTORY IS BEI
NG READ":PRINT"    INTO MEMORY F
ROM THE DISK"
50 FOR S=3 TO 18
60 DSKI$ 0,17,S,A$,B$
70 IF ASC(MID$(A$,1,1))=255 THEN
 120
80 FOR P=1 TO 128 STEP 32
90 P$(M+P/32)=MID$(A$,P,32)
100 P$(M+4+P/32)=MID$(B$,P,32)
110 NEXT P: M=M+8: NEXT S
120 M=M-1:PRINT:PRINT TAB(6)"ALL
 KILLED FILENAMES":PRINT TAB(7)"
ARE BEING REMOVED."
130 FOR P=1 TO M
140 IF ASC(MID$(P$(P),1,1))<>0 T
HEN 160
150 P$(P)=STRING$(32,255)
160 NEXT P
170 PRINT:PRINT" NOW ALPHABETIZI
NG, PLEASE WAIT"
180 LET S = M-1
190 IF S=0 THEN 260
200 FOR P =1 TO S
210 IF P$(P) < P$(P+1) THEN 250
220 H$ = P$(P)
230 P$(P) = P$(P+1)
240 P$(P+1) = H$
250 NEXT P: S= S-1:GOTO190
260 FORI=5 TO 14:PRINT@I*32,STRI
NG$(32,32);:NEXT I
270 PRINT@160,"    THE NEW DIREC
TORY CAN NOW":PRINT TAB(6)"BE ST
ORED ON THE DISK"
280 S=3:FOR P =1 TO M STEP 8
290 A$="":B$=""
300 FOR N= 0 TO 3
310 A$=A$+P$(P+N): B$=B$+P$(P+4+
N)
320 NEXT N
330 DSKO$ 0,17,S,A$,B$
340 S= S+1: NEXT P
350 PRINT:PRINT TAB(5)"THE PROCE
SS IS COMPLETE"
360 PRINT:PRINT"  WOULD YOU LIKE
 TO ALPHABETIZE":PRINT"     ANOT
HER DISK DIRECTORY?":PRINT TAB(8
)"TYPE 'Y' FOR YES OR":PRINT TAB
(8)"TYPE 'N' FOR NO"
370 K$ = INKEY$: IFK$=""THEN 370
380 IFK$ ="Y" THEN 10
390 IFK$<>"N" THEN 370
400 CLS:PRINT"      THE PROGRAM
HAS BEEN":PRINT"   TERMINATED.
TYPE 'RUN' TO":PRINT TAB(12)"CON
TINUE"
410 END
```


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Best Timing for 512K

by Marty Goodman
Contributing Editor

I just purchased the Disto 512K upgrade board for my CoCo 3. The installation instructions that came with it recommend clipping two capacitors. You seemed to imply in your RAINBOW column of March 1989 that the Hemphill mod (adding a 47-ohm resistor in parallel with R22) is better and would make the DRAM chips run cooler. Can I use the Hemphill mod with my Disto memory board?

Thomas W. Fann (TOMFANN)
Akron, Ohio

You can try using the Hemphill mod with the Disto or any other memory board. I should clarify, however, that I had reports and not actual personal data on the value of the Hemphill mod. Honestly, my own two 512K CoCo 3s have the clipped capacitor mod and seem to work quite well. The DRAMs are warm to the touch, but not broiling hot. I suggest you just try one timing fix. If you run into problems such as excessive heat on the DRAM chips or too many sparklies on the screen, try the other and see if matters improve. A lot may depend on differences between timing parameters of various brands of DRAM chips you might put in the upgrade.

Switch-Hitting Monitor

How would I change my Magnavox 1CM135 monitor to allow convenient switching between the analog and TTL inputs? I want to have my CGA video and CoCo analog video connected to a switch box so I can easily switch the monitor between the two machines.

Dave Robling (1ARMBANDIT)
Mills, Wyoming

A device to accomplish what you want would involve very tedious modification inside the monitor, as well as construction of a multiple switch box. Not only do you need to switch the seven separate video lines at the input, but the monitor itself must be switched between its analog and TTL mode. You would have to go inside the monitor and externalize whatever is connected to the TTL/Analog switch. All of this would take a lot of time, effort and the use of either a switch with many poles or a bunch of relays. Practically speaking, I doubt it would be worth all that trouble.

In Search of Soldering Irons

Can you recommend a soldering iron to me? Can you suggest how I might fix a modem in which the 5-volt regulator and heat sink get so hot they often appear to cook other nearby chips causing the modem to seize up after about an hour of use?

Phillip Brown (THEFERRET)
Berkeley, California

I use old Weller WCTPN solder stations. These sold new for over $100, but I picked mine up for $20 each, or less, at ham and other electronics flea markets. Such bargain purchases usually require repair, but repairs on these items are extremely easy to make. The design is very simple and straightforward. Weller is also very good about supplying service information and whatever parts you need at rather reasonable prices. These temperature-regulated, 60-watt units heat quickly and have lots of reserve power for tough jobs. For most of my fine work I use the Weller PTR-7 tip. This is a screwdriver shaped tip that is 1/32" wide and heats to 750 Fahrenheit. Also consider Radio Shack's "build your own" soldering iron. Specifically, purchase catalog numbers 64-2080 (handle), 64-2081 (700-Fahrenheit heating unit) and one or more of their collections of tips for the same (64-2089, 64-2074, 64-2084). This system is, I believe, actually made by Ungar. Parts for it are probably not only available through Radio Shack, but through suppliers of Ungar soldering equipment as well. Radio Shack's prices are quite reasonable. Several of my friends have used this system and reported it works well for them.

As for your modem, I have fixed similar problems by removing the 5-volt regulator and placing it in a separate box with a heat sink on it. This results in the heat being dissipated outside the modem box where it doesn't affect other nearby chips. [*Ed. Note: Marty notes that when this repair was attempted, the modem still had problems, apparently due to other regulators in the area or a flaky VLSI modem chip.*]

File Comparisons

Is there a Compare program that compares two copies of a disk file byte-for-byte to see if they are identical? I ask because I am concerned about possible viruses or worms.

Lorin E. Owens
Bakersfield, California

Many years ago Don Hutchison wrote a *Disk Compare* program. I believe a copy of it is posted in the Utilities section of the Delphi CoCo SIG. This program compared every byte of one file to another with the proviso that the files had to be binary program files and one had to reside in memory during the comparison. However, I would not worry about CoCo viruses or worms. There has never been a report of a CoCo Disk BASIC virus. In theory one could be

---

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

made, but it is awfully diffcult to do and would be easily thwarted; a BACKUP command would cleanse any infected disks. An OS-9 virus is more likely, though to date there have been no such reports.

Cassette Port Dissected

I use BASIC09 and assembly language, and want to use the cassette port on the CoCo 3 to communicate with the outside world. Can you help me with the addresses for that port?

Nyle A. Tack (BTACK)
Peralta, New Mexico

Fully using the cassette port may be more difficult than you think. The 5-pin port consists of a relay-controlled switch (cassette-motor relay), a zero-crossing detector input and a 6-bit digital-to-analog converter output. Under Radio Shack BASIC, the relay is used to switch the cassette motor on and off. The zero-crossing detector is used in conjunction with appropriate assembly-language software to detect the frequency and duration of an incoming cassette tone. The D-to-A converter is used, again in conjunction with ML software, to generate tones of specific types. All of these are controlled by a 6821 PIA chip, which is addressed internally in the CoCo from $FF20 through $FF23.

The cassette-motor switch is easy to use. Pins 1 and 3 of the cassette port are hooked to SPST relay contacts. The relay is controlled by the CA2 line of the PIA. This is mapped to Bit 3 of the control word at $FF23. If bits 4 and 5 of $FF23 are set to 1 (High), Bit 3 of $FF23 can be used to control the cassette motor by writing a 0 or 1 to it. See the Motorola data sheet for the 6821 chip for details on control of the CA2 line.

The zero-crossing detector is fed by Pin 5 of the cassette port. If a zero crossing is detected, Bit 0 of the PA0 port of the PIA (mapped to $FF20) is affected. Of course, that bit must be programmed as an input via the appropriate technique involving the control word at $FF21. Again, see the data sheet for the Motorola 6821 for details.

The D-to-A converter sends its output to Pin 4 of the cassette port. Pin 2 is ground. The voltage fed to Pin 4 is affected by the value written into bits 2 through 7 at port PA0 (address $FF20). Again, those bits must be programmed as inputs first.

Unfortunately, OS-9 is a uniquely rotten environment for using either the zero-crossing detector or the A-to-D converter to recognize and generate tones. This is due to the fact that such ports require constant attention by software, which is something OS-9 is unable to do. However, you should have no trouble using the CoCo's cassette-motor relay under OS-9. If you are switching high voltages or a large current, you should add a second relay in cascade that is rated for the voltages and currents you want to switch.

If you plan to pursue this matter, it is almost essential to have the data sheet for the Motorola 6821 chip and the full service

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manual for the CoCo 3. The latter provides not only the CoCo 3's schematic, but also diagrams of the innards of two custom I/O chips in the CoCo 3, which are critical to understanding the cassette input.

To further pursue use of the available possibilities on the CoCo, I highly recommend Bill Barden's new book, *Connecting the CoCo to the Real World.*

Get a Boot out of DOS

How do I use the DOS command to achieve auto-execution of a program?

Alexi. D. Papaleonardos (WTHUNDER)
Columbus, Ohio

The DOS command causes the CoCo to load all data on Track 34 of the disk into memory starting at Location $2600. The CoCo then examines the contents of $2600 and $2601, which are the first two bytes of the first sector of Track 34. If it finds $2600 to contain the ASCII code for O and $2601 to contain the ASCII code for S, it then proceeds to execute the code it finds starting at location $2602. If it does not find OS in $2600 and $2601, program control is returned to BASIC. You must make the first two bytes of sector 1 of Track 34 be $4F and $53. Follow that with whatever machine-language loader program you want to start your code. Note that your loader program will probably involve code that loads other sectors from the disk using the DSKCON routine in BASIC or your own DSKCON-like routine in Track 34. You'll also need to lock Track 34 out of use via the granule allocation table to prevent that track from being overwritten. For more information, see Roger Schrag's "A Special Use for the DOS Command" (Rainbow, November 1984, Page 140).

High-Speed Bit-Banger

Is there any way to use the timer and serial-port interrupt lines in the CoCo 3 to make a bit-banger device driver for OS-9 that would allow use of the bit-banger port with a modem at speeds of 1200 baud or higher?

Jason Bucata (JBUCATA)
Ferndale, Michigan

One problem is the serial-port input interrupt is incorrectly wired on the CoCo 3. It triggers on the wrong edge of the incoming signal making it useless for its intended purpose, which is detection of the start bit of each incoming word. This can be fixed with a very simple hack inside the CoCo 3 (a single trace cut and a jumper to remove an unneeded inverter gate from the circuit). But since a hardware hack is required, few people have developed enthusiasm for writing driver software. It is also possible to make a special cable that shorts the bit-banger serial input to the bit-banger carrier detect. Then program the PIA chip that sees the carrier detect to generate an interrupt on each incoming start bit. This eliminates the internal hack, but requires a special cable. Long ago, one company produced an OS-9 terminal program that used such a trick for Level I OS-9 and the CoCo 1. (This matter was further discussed among OS-9 experts on the Delphi OS-9 SIG. Bruce Isted preformed some calculations and guesstimations from which he concluded that it should be possible to write a bi-directional bit-banger driver for OS-9 Level II that would work at 1200 baud provided not too many other tasks were being performed. His calculations indicated that at 2400 baud, this hypothetical driver would tie up more than half of the CoCo 3's time, even with use of the interrupt and timer, and would not be acceptable for OS-9 multitasking. I know of no attempts to actually write such a driver. Frankly, it would seem to be a worthwhile endeavor.)

Power from the Multi-Pak

Where do I find +5v, +12v, -12v and ground on the Multi-Pak Interface?

Steve Ricketts (STEVEPDX)
Portland, Oregon

Pin 1 of the Multi-Pak supplies -12 volts at 100 mA, Pin 2 supplies +12 volts at 300 mA and Pin 9 supplies +5 volts at up to about an amp. Pins 33 and 34, as well as the clips on each side of the 40-pin connectors, are ground. Note that these voltages are also available on the CoCo 1, but a +/-12-volt signal is not found on the CoCo 2 or 3.

No Semigraphics for CoCo 3

My Audio Spectrum Analyzer and Plug 'n Power ROM Paks work fine on my CoCo 1 and 2, but give unuseably distorted displays on my CoCo 3. What is the problem and can it be fixed?

Thomas E Lucas (TOMLUCAS)
La Grange, Illinois

Both of these ROM paks use the Semigraphics mode of the VDG chip in the CoCo 1 and 2 to achieve a combination of many colors and text on the screen at once with minimal memory for the program. This complex Block Graphics/Text mode is not supported by the GIME chip in the CoCo 3. Fixing the programs would involve considerable rewriting. No fixes are available at this time. Note that in the case of Spectrum Analyzer, Steve Bjork wrote a version that did not use the Semigraphics mode, but it took more space than the 4K he had available for the ROM pak. Sadly, his non-Semigraphics version is legally tied up and won't be released.

Picturing the Sega

How do I connect my Magnavox 8CM515 monitor to a Sega Genesis video game machine? I tried to hook the 8-pin TTL video port on the Magnavox 8CM515 to the 8-pin port on the Sega using Sega pinout information you supplied, but cannot get an image. I am puzzled by the fact that my Sega puts out Hsync and Vsync on the same pin, whereas my Magnavox apparently requires separate lines. Also, what is the use of the +5-volt and composite-video lines on the Sega Genesis and of the Intensity line on the Magnavox video input.

Jody Ronning
Melrose, Wisconsin

First of all, you must not use the 8-pin TTL input port on the Magnavox. Instead, use the 6-pin analog-video input port since the Sega Genesis puts out analog video. The sync input circuitry on the Magnavox monitor is set up so it does not care what kind of sync you feed it; separate or combined, positive or negative. Just feed whatever sync you have into either (or both) the Hsync or Vsync inputs of the Magnavox. It will sort it all out and get the sync info it needs. Note this is not the case with the CM-8 monitor, which is less intelligent with respect to sync input. The CM-8 requires separate positive sync signals and will accept nothing else. For your reference, the 6-pin port on the Magnavox analog input has the following pinout:

1 — green
2 — Hsync
3 — gnd
4 — red
5 — blue
6 — Vsync

Pin 6 is the center pin, and pins 1 thru 5 are numbered sequentially clockwise as one looks at the socket on the Magnavox.

The +5-volt line on the Sega is present to allow powering some small circuit to facilitate sync conversion to produce different polarity or separate sync signals for monitors. The video output is present to feed into the composite-video input of monitors that have the same. This is the same type of one-line video signal used between present day VCR's and TV/monitors. This kind of video is also called *NTSC composite video.* Note that this sort of video will not give as nice a picture as RGB

video will. You do not need either the +5-volt line or the video line to connect your Magnavox 8CM515 monitor. You can run a cable that goes from the video line of the Sega to the video input on your Magnavox just to see how much poorer the video image is than the RGB image. The Intensity line is part of the IBM CGA digital video protocol and is of no use with the analog video output of the Sega or CoCo.

CM-8 for VGA?

Can I use my CM-8 monitor with an IBM VGA card?

Alan Parker
Grissom AFB, Indiana

No. The VGA card requires a monitor that can sync to a horizontal scan of 31.5 KHz. The CM-8 syncs to only 15.75 KHz. Note that even when emulating CGA video, VGA cards put out a video signal that syncs at 31.5 KHz. In that mode, the VGA card scans each line of the VGA monitor twice in order to achieve lower CGA-type resolution. This is of no help to someone trying to use a CM-8.

Avoid a CoCo 3 Funeral

My CoCo 3 recently died. When I turn it on I get a blank screen. Is the GIME chip bad? The 68B09E? Radio Shack wanted $50 just to diagnose the problem with no guarantee of fixing it for that price. I am not familiar with working on electronic equipment and cannot replace a soldered chip. Who can help me fix the computer?

Brad Renfro
Owensboro, Kentucky

If you do not have access to a friend who is skilled at desoldering and socketting 40-pin chips, your best alternative may be to just look for a good buy on a new CoCo 3. Note that they occasionally go on sale for $129 at Radio Shack. CoCo Pro! (a RAINBOW advertiser) sometimes can sell used CoCo 3s for $100 or less. What I would do is try the GIME chip from the bad computer in a known working computer. If that chip tests good, I'd swap out memory from the bad computer into a good computer to see if the memory was bad. If the memory tested good, we have exhausted the possibilities for socketted chips. The next thing I would do is desolder the 68B09E chip, solder in a socket and insert a new, good 68B09E. 68B09E chips are available from Jameco of Belmont, California, but a $25 minimum order is required. They are also available through several RAINBOW advertisers, including Microcom and Disto.

[*Editor's Note: We recently had a similar problem with one of our CoCo 3s. We removed the cover and pressed firmly on all four corners of the GIME chip. This took care of the problem immediately. Of course, we suggest reseating the GIME with "proper" tools.*]

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P. O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services. Then at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form, which has complete instructions.

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Making numbers as fun as words

In the Name of EQUALITY

by Bob Delbourgo

Scrabble is as popular today as the day it first came out on the market some three decades ago. By contrast, the game *Equable* (the numerical version of *Scrabble*) made a brief appearance about ten years ago but is now almost forgotten. This may be because people feel more comfortable with words than with numbers. Whatever the reason, I thought it would be a good time to resurrect the numerical version as a challenging and educational game. I have dubbed it *Equality*.

The instructions for *Equality* are included in the listing. I will not repeat them except to emphasize that you are dealing with integer arithmetic (whole numbers from 0 to 9). This means the strict order of operations is division followed by multiplication followed by subtraction and then addition — the way the CoCo handles sums.

Move the cursor with the arrow keys and type in the character (from the hand you have been dealt) to make an insertion there. You begin with two "equals" (=) signs. As the game progresses you may run out of them, at which time you can change your hand by pressing C, thereby missing a turn. Please ensure that sums are properly separated and do not involve more than one equals sign. Otherwise CoCo will react. The computer also checks to see that your entries are along a line and that your sums along that line are numerically accurate. It does not check whether they fit in an orthogonal sense (although in principle it could have been programmed to do so — but that would take too long). Your score is based on the number and type of pieces you have placed, not on what has already been laid on the board in a previous round (for the precise values, read the directions in the listing).

The listing has been liberally commented, so I will not say much about it. The only noteworthy part is the subroutine in lines 950 through 1140, which calculates the sum when a string (A$) is input. The game should appeal to math teachers at the primary level but can nevertheless be played seriously at higher levels. It can even be played solo, the aim being to maximize your score within 24 rounds.

❑

Bob is a professor of physics, and he computes as a hobby. His interests lean toward scientific simulations and mathematical games. He may be contacted at 15 Willowdene Avenue, Sandy Bay, Hobart, Tasmania, Australia 7005.

```
50 ..... 76
110 ..... 22
170 ..... 247
230 ..... 141
290 ..... 153
330 ..... 205
430 ..... 98
520 ..... 201
609 ..... 204
650 ..... 101
710 ..... 119
760 ..... 70
820 ..... 185
880 ..... 124
960 ..... 91
1030 ..... 217
1080 ..... 39
END ..... 221
```

The Listing: EQUALITY

```
0 'COPYRIGHT 1990 FALSOFT, INC.
9 'initialise variables and strings
10 CLEAR500:GOTO1150
20 DIMC(5),A(13),PT(15),PE(15):R=RND(-TIMER):C$=CHR$(8)+CHR$(9)+CHR$(10)+CHR$(94)+"0123456789=+-*/RCP"
30 C(1)=61:C(2)=43:C(3)=45:C(4)=42:C(5)=47:T1$="L9T25V103C":T2$="L10T10V901GO2GO3GO4GO5GO4GO3GO2GO1G"
40 FORI=1TO7:N$=N$+CHR$(159)+CHR$(239):NEXTI:N1$=CHR$(239)+N$:N2$=N$+CHR$(159)
50 FORI=1024TO1534STEP2:N=RND(5):R=RND(10):POKEI,47+R:POKEI+1,C(N):NEXTI
60 PRINT@140,"EQUALITY";:PRINT@236,"SCRABBLE";:PRINT@110,"N";:PRINT@174,"M";:PRINT@206,"E";:PRINT@270,"I";:PRINT@302,"C";:PRINT@334,"A";:PRINT@272,"Y";:PRINT@362,"R.DELBOURGO";
70 PLAY"L8CCL4FFL8FL4AL12GP12FGP12AL4F"
80 PRINT@481,STRING$(5,"=")"INSTRUCTIONS <Y/N> ?"STRING$(5,"=");
90 I$=INKEY$:IFI$="N"THEN200ELSEIFI$="Y"THEN100ELSE90
99 'instructions
100 CLS:GOSUB1130:GOSUB1140
110 PRINT"THIS BOARD GAME (FOR UP TO FOUR PLAYERS) IS A NUMERIC VERSION OFSCRABBLE. EVERY PLAYER IS DEALT 6 INTEGERS (0-9) AND 5 OPERATORS(=,+,-,*,/) AT RANDOM WHICH ARE USED TO BUILD VALID SUMS ALONG  A HORIZONTAL or VERTICAL LINE."
120 GOSUB1140:PRINT"THE BOARD IS 15X15 AND INTEGERS MUST BE LAID ON "CHR$(239)",OPERATORS ON "CHR$(159);
130 PRINT"ALL SUMS MUST BE SEPARATED BY "CHR$(239)" AND/OR "CHR$(159)", CAN ONLY CONTAIN one =BUT ANY # OF INTEGERS/OPERATORS.";
140 GOSUB1110
150 CLS:GOSUB1130:GOSUB1140
160 PRINT"THE ORDER OF OPERATIONS IS FIXEDTO BE: DIVISION, MULTIPLICATION,SUBTRACTION AND THEN ADDITION."
170 GOSUB1140:PRINT"FOR EACH PIECE PLAYED SCORING IS #:VALUE OF DIGIT                =:1    +:3
   -:5    *:7    /:9";
180 GOSUB1140:PRINT"YOU INSERT YOUR PIECES BY TYPINGTHE APPROPRIATE CHARACTER.  WHENFINISHED <P> PASSES PLAY TO NEXTPLAYER. <R> TO RETRACT INCORRECTENTRY, <C> TO CHANGE all PIECES.";
190 GOSUB1110
199 'determine # players and initialise remaining quantities
200 CLSRND(7)+1:GOSUB1130
210 PRINT@64,"HOW MANY PLAYERS (4 MAX.)";:INPUTNP:NP=INT(NP):IFNP<1ORNP>4THENSOUND200,2:GOTO210
220 DIMP$(NP),SC(NP),NN$(NP),OO$(NP):RM=24/NP
230 FORI=1TONP:PRINT@64*(I+1),"PLAYER #"I"YOUR NAME";:INPUTP$(I):IFLEN(P$(I))>8THENP$(I)=LEFT$(P$(I),8)
240 NEXTI
250 CLS:FORI=0TO15:POKE1504+I,175:POKE1039+32*I,175:POKE1072+I,175:POKE1232+I,175:POKE1296+I,175:NEXTI:POKE1048,175
260 FORI=0TO96STEP32:POKE1112+I,175:NEXTI:FORI=1TONP:SC(I)=0:NN$(I)="":OO$(I)="":NEXTI:RD=0:X=7:Y=7
270 FORI=0TO448STEP64:PRINT@I,N1$;:NEXTI:FORI=32TO416STEP64:PRINT@I,N2$;:NEXTI
280 PRINT@17,"PLAYER";:PRINT@26,"SCORE";:FORI=1TONP:PRINT@48+32*I,P$(I);:NEXTI
290 PRINT@304,"move cursor with";:PRINT@336,"the arrow keys.";:PRINT@368,"type character";:PRINT@400,"to insert piece,";:PRINT@432,"<R> to retract";:PRINT@464,"<C> to change,";:PRINT@496,"<P> to pass.";
299 'deal pieces to each player, 6 numbers, 3 operators and 2 =
300 FORI=1TONP:FORJ=1TO6:NN$(I)=NN$(I)+CHR$(47+RND(10)):NEXTJ:FORJ=1TO3:OO$(I)=OO$(I)+CHR$(C(RND(4)+1)):NEXTJ:OO$(I)=OO$(I)+"=="
:NEXTI
309 'start game
310 P=0:RD=RD+1:IFRD=RM THEN370
319 'show hand and wait for keypress
320 Q=1:T$="":S$="":P=P+1:IFP=NP+1THEN310
330 PRINT@240,CHR$(229)+NN$(P)+CHR$(234)+CHR$(149)+OO$(P)+CHR$(154)+CHR$(175);
340 I$=INKEY$:GOSUB780:IFI$=""THEN340
350 ONINSTR(1,C$,I$) GOTO390,410,430,450,470,470,470,470,470,470,470,470,470,490,490,490,490,490,510,560,600
360 GOSUB780:GOTO340
370 PRINT@483,"GAME OVER!";:PLAYT2$:PRINT@17,"<S> TO RESTART"
380 IFINKEY$<>"S"THENPRINT@17,"<s> to restart";:GOTO370ELSE250
390 X=X-1:IFX<0THENX=0 'left
400 GOTO340
410 X=X+1:IFX>14THENX=14 'right
420 GOTO340
430 Y=Y+1:IFY>14THENY=14 'down
440 GOTO340
450 Y=Y-1:IFY<0THENY=0 'up
460 GOTO340
469 'number insertion
470 I=INSTR(1,NN$(P),I$):IFI=0ORPEEK(1024+X+32*Y)<>239THENSOUND100,1:GOTO340
480 GOSUB790:GOTO330
489 'operator insertion
490 I=INSTR(1,OO$(P),I$):IFI=0ORPEEK(1024+X+32*Y)<>159THENSOUND100,1:GOTO340
500 GOSUB820:GOTO330
509 'retraction routine
510 IFQ=1THENSOUND100,1:GOTO340
520 FORI=1TOQ-1:POKEPT(I),PE(I):NEXTI 'restore board
530 NN$(P)=NN$(P)+S$:S$="" 'readjust strings
540 OO$(P)=OO$(P)+T$:T$=""
550 Q=1:GOTO330
559 'change routine
560 IFQ>1THENSOUND100,1:GOTO330ELSENN$(P)="":OO$(P)=""
570 FORJ=1TO6:NN$(P)=NN$(P)+CHR$(47+RND(10)):NEXTJ
580 FORJ=1TO4:OO$(P)=OO$(P)+CHR$(C(RND(4)+1)):NEXTJ:OO$(P)=OO$(P)+"="
590 PRINT@58+32*P,USING"####";SC(P):PLAYT2$+T2$+T2$+T2$:GOTO320
600 SC=0:IFQ=2THEN770
609 'pass routine
610 PRINT@484,"CHECKING";:D=PT(2)-PT(1):IFABS(D)>15THEND=32ELSED=1
620 FORII=2TOQ-1:IFD=1ANDABS(PT(II)-PT(1))>15THEN770 'check if horizontal
630 IFD=32ANDPT(II)-PT(1)<>32*INT((PT(II)-PT(1))/32)THEN770 'check if vertical
640 NEXTII
649 'determine string along line of play
650 L$="":IFD=1THENP1=32*INT(PT(1)/32):FORI=P1 TOP1+14:L$=L$+CHR$(PEEK(I)-64):NEXTI 'along horizontal
660 IFD=32THENP1=1024+PT(1)-32*INT(PT(1)/32):FORI=P1 TOP1+448STEP32:L$=L$+CHR$(PEEK(I)-64):NEXTI 'along vertical
670 L=LEN(L$)
679 'break up into substrings for analysis
680 FORK=1TOL:IFMID$(L$,K,1)=CHR$(95)ORMID$(L$,K,1)=CHR$(175)THENNEXTK
690 L$=RIGHT$(L$,L-K+1):L=L-K+1
700 FORJJ=1TOL:IFMID$(L$,JJ,1)=CHR$(95)ORMID$(L$,JJ,1)=CHR$(175)THEN710ELSENEXTJJ
709 'get substring
710 SS$=LEFT$(L$,JJ-1):SS=LEN(SS$):IFSS>1THENGOSUB850:IFKK=1THEN
```

```
770
720 IFL<JJ THEN730ELSEL$=RIGHT$(
L$,L-JJ+1):L=L-JJ+1:GOTO680
730 FORTT=1TOLEN(S$+T$):TT$=MID$
(S$+T$,TT,1):SC=SC+INSTR(1,"1234
56789",TT$)+INSTR(1,"= + - * /",
TT$):NEXTTT
740 SC(P)=SC(P)+SC:PRINT@58+32*P
,USING"####";SC(P):PRINT@484,STR
ING$(8,175);
750 PLAYT2$+T2$+T2$+T2$:IFLEN(S$
)>0THENFORJ=1TOLEN(S$):NN$(P)=NN
$(P)+CHR$(47+RND(10)):NEXTJ
755 IFLEN(T$)>0THENFORJ=1TOLEN(T
$):OO$(P)=OO$(P)+CHR$(C(RND(4)+1
)):NEXTJ
760 GOTO320
770 PRINT@484,"INVALID!";:SOUND1
0,20:PRINT@484,STRING$(8,175);:G
OTO520
780 PT=1024+X+32*Y:PP=1080+32*P:
PE=PEEK(PT):POKEPT,PE:POKEPT,191
:POKEPP,175:POKEPP,207:PLAYT1$:P
OKEPP,175:PT(Q)=PT:PE(Q)=PE:POKE
PT,PE:RETURN
789 'readjust number string
790 NN=LEN(NN$(P)):NN$(P)=LEFT$(
NN$(P),I-1)+RIGHT$(NN$(P),NN-I)
800 S$=S$+I$:PRINT@X+32*Y,I$;:Q=
Q+1
810 PLAYT2$:RETURN
819 'readjust operator string
820 OO=LEN(OO$(P)):OO$(P)=LEFT$(
OO$(P),I-1)+RIGHT$(OO$(P),OO-I)
830 T$=T$+I$:PRINT@X+32*Y,I$;:Q=
Q+1
840 PLAYT2$:RETURN
850 KK=0:FORI=1TO13:A(I)=0:NEXTI
:IFSS=2*INT(SS/2)THENKK=1:RETURN
 'valid string must be odd
860 FORI=1TOSS STEP2:N$=MID$(SS$
,I,1):IFN$<"0"ORN$>"9"THENKK=1:R
ETURN 'test number sequence
870 FORI=2TOSS STEP2:O$=MID$(SS$
,I,1):IFO$="/"ORO$="*"ORO$="-"OR
O$="+"ORO$="="THENNEXTI ELSEKK=1
:RETURN 'test operator sequence
880 E=0:FORI=2TOSS STEP2:IFMID$(
SS$,I,1)="="THENE=E+1 'test # eq
ual signs in substring
890 NEXTI:IFE=0ORE>1THENKK=1:RET
URN
900 FORI=2TOSS STEP2:IFMID$(SS$,
I,1)<>"="THENNEXTI ELSEE=I
910 LL$=LEFT$(SS$,E-1):RR$=RIGHT
$(SS$,SS-E) 'split substrings on
 either side of = sign
920 A$=LL$:GOSUB950:LL=A:A$=RR$:
GOSUB950:RR=A
930 IFABS(LL-RR)>.000001THENKK=1
940 RETURN
949 'carry out the sums on the s
trings
950 N=(LEN(A$)+1)/2:O=N-1
960 FORI=1TON:A(I)=VAL(MID$(A$,2
*I-1,1)):NEXTI
970 O$="":FORI=1TOO:O$=O$+MID$(A
$,2*I,1):NEXTI
979 'division first
980 DI=INSTR(1,O$,"/"):IFDI=0THE
N1010
990 A(DI)=A(DI)/A(DI+1):FORI=DI+
1TON:A(I)=A(I+1):NEXTI
1000 O$=LEFT$(O$,DI-1)+RIGHT$(O$
,O-DI):N=N-1:O=O-1:GOTO980
1009 'then multiplication
1010 MU=INSTR(1,O$,"*"):IFMU=0TH
EN1040
1020 A(MU)=A(MU)*A(MU+1):FORI=MU
+1TON:A(I)=A(I+1):NEXTI
1030 O$=LEFT$(O$,MU-1)+RIGHT$(O$
,O-MU):N=N-1:O=O-1:GOTO980
1039 'then subtraction
1040 SU=INSTR(1,O$,"-"):IFSU=0TH
EN1070
1050 A(SU)=A(SU)-A(SU+1):FORI=SU
+1TON:A(I)=A(I+1):NEXTI
1060 O$=LEFT$(O$,SU-1)+RIGHT$(O$
,O-SU):N=N-1:O=O-1:GOTO1040
1069 'then addition
1070 AD=INSTR(1,O$,"+"):IFAD=0TH
EN1100
1080 A(AD)=A(AD)+A(AD+1):FORI=AD
+1TON:A(I)=A(I+1):NEXTI
1090 O$=LEFT$(O$,AD-1)+RIGHT$(O$
,O-AD):N=N-1:O=O-1:GOTO1070
1099 'the final result of the su
m
1100 A=A(1):RETURN
1110 PRINT@481,STRING$(9,"=");"t
ype any key"STRING$(9,"=");
1120 IFINKEY$=""THEN1120ELSERETU
RN
1130 PRINTSTRING$(12,"=")"equali
ty"STRING$(12,"=");:RETURN
1140 PRINTSTRING$(32,"=");:RETUR
N
1150 PCLEAR2:GOTO20
```


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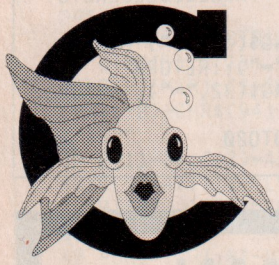
Try your creative hand at writing poetry

Fishing for the Right Words

by Solla Carrock



Computer poetry — a new genre. *Fishbowl* encourages you to let your creative juices flow. The program randomly chooses words or phrases in the data lines and displays 12 of them. You then use the 12 words to compose a poem. The words I've put in the data lines are geared for a child, but an adult could also use them or modify the selection of words and phrases.

The 12 words act as a stimulus for writing a poem by requiring you to make unusual combinations of ideas and imagery. You can edit your work by replacing old lines with new ones. You can also print the poem at any time.

After the 12 words are shown on the screen, type in lines of the poem based on the words given. Up to 100 lines may be typed in (with an average of 90 characters or less per line). You must press ENTER to indicate the end of a line. To see the 12 words again, enter an asterisk (*), then continue to add to the lines of the poem. To make a new choice, type a slash (/) and press ENTER.

Solla Carrock is a writer and artist, with a master's degree in psychology. She has worked with children and has taught and counseled adults as well. She purchased a Color Computer about a year ago — for her daughter — and has been writing programs ever since.

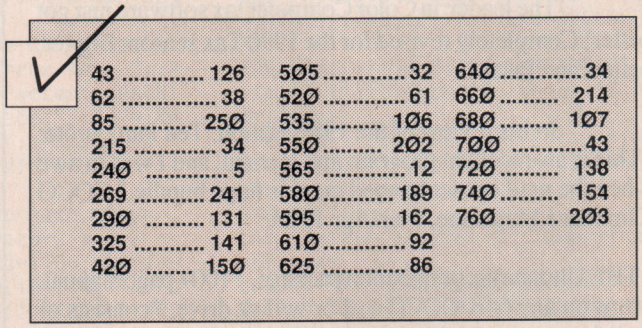
The program gives you a list of choices: View the poem, Print the poem, Change a line, Add new lines, or Write a new poem.

If you choose Option 1, press the @ key to print the first line of the poem on the screen. Press it repeatedly to print succeeding lines. Press R for a list of choices.

If you choose Option 2, you can print the poem by entering the letter P. If you do not type P, you are returned to the menu.

Option 3 lets you replace an old line with a new one. Type the line number and press ENTER. The old line is displayed, and you are asked to type a new line to replace

32K Extended



43 126	505 32	640 34
62 38	520 61	660 214
85 250	535 106	680 107
215 34	550 202	700 43
240 5	565 12	720 138
269 241	580 189	740 154
290 131	595 162	760 203
325 141	610 92	
420 150	625 86	

The Listing: FISHBOWL

```
0 'COPYRIGHT 1990 FALSOFT, INC.
1 PCLEAR 1:REM FISHBOWL
10 CLEAR 9000
15 DIM P$(100)
20 DIM A$(1000)
25 DIM WO$(15)
30 REM OPENING DISPLAY AND SONG
35 CLS 0:FOR X=23 TO 32
36 SET(X,11,4)
37 NEXT X
38 FOR X=21 TO 32
39 SET (X,19,4):NEXT X
40 FOR Y=11 TO 19
41 SET(41,Y,4)
42 NEXT Y
43 SET(22,12,4):SET(19,15,4):SET
(25,13,4)
44 SET(21,13,4):SET(19,17,4)
45 SET(20,14,4):SET (20,18,4)
46 X=33:Y=11
47 FOR T=1 TO 8
48 SET(X,Y,4)
49 X=X+1:Y=Y+1
50 NEXT T
51 X=33:Y=18
52 FOR T=1 TO 8
53 SET(X,Y,4)
54 X=X+1:Y=Y-1
55 NEXT T
56 SET(20,15,4):SET (21,15,4)
```

it. Then you are returned to make a new choice.

If you choose Option 4, you can again add lines to the end of the poem.

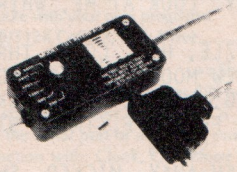
Option 5 asks you to type P and press ENTER to start a new poem with a new list of words. The program reminds you that this means the old poem will be lost, so if you fail to enter P, you are returned to the choices and given a chance to print or copy the poem before going on.

While entering *Fishbowl*, you may change or add to the data lines, as long as you don't exceed 1000 pieces of data. Remember to put a @ character as the last piece of data (not anywhere else) in the data lines. Type RUN and press ENTER. If the program is typed in correctly, you should see a fish in a fishbowl and hear music then, after a pause, a word list and instructions.

Make sure the program works correctly by using it — try all the options. Correct any errors by checking your program lines against the program listing. When you are sure the program works correctly, save the program on disk or tape. Enjoy.

❑

```
57 SET(20,17,4):SET(21,17,4)
60 FOR X=9 TO 59
62 SET(X,7,5)
64 NEXT X
66 FOR X=13TO55
68 SET(X,29,5)
70 NEXT X
72 FOR Y=12 TO 26
74 SET(10,Y,5):SET(58,Y,5)
76 NEXT Y
78 SET(10,8,5):SET(11,9,5):SET(1
2,10,5)
80 SET(11,11,5):SET(11,27,5):SET
(12,28,5)
82 SET(58,8,5):SET(57,9,5):SET(5
6,10,5)
84 SET(57,11,5):SET(57,27,5):SET
(56,28,5)
85 PLAY "O3L4DDEGF+EDDEGF+EDGF+G
AGEL3DL2DL4DEFECO2BAO3DEDO2BAGBO
3DGFEFL3GL2G"
155 PRINT@11,"FISHBOWL"
160 REM READ IN WORDS,RANDOMLY C
HOOSE 12 AND PRINT WITH INSTRUCT
IONS
165 N=1
170 READ A$(N)
175 IF A$(N)="@" THEN 190
180 N=N+1
185 GOTO 170
190 FOR T=1 TO 12
195 R=RND(N-1)
200 WO$(T)=A$(R)
205 NEXT T
210 CLS 0:L=1
215 PRINT"THESE ARE THE WORDS YO
U'VE CAUGHT FROM THE FISHBOWL:";
220 GOSUB 252
225 PRINT "USE THESE WORDS TO WR
ITE A POEM. IF YOU NEED OTHER WO
RDS YOU MAY USE THEM TOO, BUT LE
T THESE BE THE MAIN WORDS."
230 LINE INPUT"PRESS ENTER TO CO
NTINUE.";AN$:CLS 0
235 PRINT"GO AHEAD AND TYPE WHAT
EVER YOU THINK OF. IT IS EASY TO
 CHANGE THINGS LATER.YOU MAY TYP
E UP TO 100 LINES(BUT LESS IF YO
UR LINES ARE VERY LONG). AFTER E
ACH LINE PRESS THE ENTER KEY.";
240 PRINT"TYPE AN ASTERICK <*> T
HEN <ENTER>WHENEVER YOU WANT TO
SEE THE WORDS YOU CAUGHT.TYPE SL
ASH</> THEN <ENTER> TO CHANGE LI
NES, LOOK AT WHAT YOU'VE WRITTEN
, OR PRINT THE POEM."
242 LINE INPUT"PRESS ENTER TO CO
NTINUE.";AN$
247 CLS 0:GOSUB 252:GOSUB 267:GO
TO 270
252 FOR T1=1 TO 12
257 PRINT WO$(T1) ": ";
262 NEXT T1:RETURN
266 REM PRINT WORDS ON PRINTER
267 LINE INPUT"IF YOU HAVE A PRI
NTER, AND IT IS ON, TYPE -P- AND
 ENTER TO PRINT WORDS,OTHERWISE
JUST PRESS ENTER";PN$
268 IF PN$="P" THEN FOR T1=1 TO
12: PRINT#-2,TAB(10)WO$(T1):NEXT
 T1
269 RETURN
270 PRINT L":";:LINE INPUT P$(L)
:REM INPUT LINES OF POEM
275 IF LEFT$(P$(L),1)="/" THEN G
OTO 290
280 IF LEFT$(P$(L),1)="*" THEN G
OSUB 252:GOTO 270
285 L=L+1:IF L>100 THEN PRINT"LI
MIT OF 100 LINES IN POEM":GOTO 2
90 ELSE GOTO 270
289 REM MAKE NEW CHOICES
290 CLS0:PRINT"DO YOU WISH TO 1>
VIEW POEM;2)PRINT POEM ON PRINTE
R;3)CHANGE A LINE; 4)ADD NEW LIN
ES;5)WRITE ANOTHER POEM?":INPUT"
TYPE NUMBER AND ENTER";AN:IF AN<
1 OR AN>5 THEN 290
295 ON AN GOTO 300,350,400,460,4
50
299 REM PRINT LINES OF POEM ONE
LINE AT A TIME
300 F=1:CLS:PRINT"PRESS <@> TO V
IEW FIRST LINE AND EACH ADDITION
AL LINE. PRESS <R> TO RETURN FOR
 NEW CHOICE"
305 AN$=INKEY$:IF AN$="" THEN 30
5
310 IF AN$="R" THEN 290
315 IF AN$="@" THEN PRINT F;":";
P$(F)
320 F=F+1:IF F=L OR F>100 THEN P
RINT"NO MORE LINES"
325 GOTO 305
349 REM PRINT POEM ON PRINTER
350 LINE INPUT"TURN ON PRINTER.
PRESS <P> THEN ENTER TO PRINT.";
AN$
355 IF AN$<>"P" THEN 290
360 FOR LI=1 TO L
365 PRINT#-2, TAB(5)P$(LI)
370 NEXT LI
375 GOTO 290
399 REM CHANGE LINE OF POEM
400 INPUT "WHICH LINE DO YOU WAN
T TO CHANGE";LN
410 PRINT LN":";P$(LN)
```

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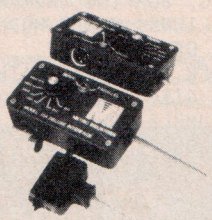

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```
415 LINE INPUT"TYPE THE NEW LINE
.";P$(LN)
420 GOTO 290
449 REM WRITE NEW POEM
450 LINE INPUT"PRESS<P> AND ENTE
R TO START A NEW POEM, OR JUST E
NTER TO MAKE A DIFFERENT CHOICE.
 REMEMBER YOU WILL LOSE YOUR OLD
 POEM IF YOU WRITE A NEW ONE, SO
 COPY OR PRINT IT IF YOU WANT TO
 KEEP IT.";AN$
455 IF AN$<>"P" THEN 290 ELSE 19
0
460 L=L-1:GOTO 285
500 DATA MAMA,SEND CHAIN,LONG AG
O,BABOON,HANDSOME,ONCE UPON A TI
ME,A VERY LOUD VOICE,BIG FEAST,S
ECRET
505 DATA IN THAT VILLAGE,SO GREE
DY, WE HAVE NONE,CHASE,FOUND HER
 VOICE,SO SAD,NOWHERE TO GO,OUR
PEOPLE,CUNNING AND BOLD,MOTHER R
ABBIT,A GOOD CLIMBER
510 DATA FLAT ROCK,CUT THE CHAIN
, OLD MOTHER, WITH A THUMP, FELL
 IN A HEAP, NEARLY SQUASHED,HOLD
ING,SHINING SEAT
515 DATA JUICE,TRIED TO KILL, BE
AUTIFUL LONG HAIR, STAND, AT LAS
T, OWN FOUR FEET, A DIFFERENCT A
NIMAL,SICKNESS,DEATHJUICE, DEAR
ONES, TWO-TIMER, SORE, THE BLOW
COMES, EMPTY ROOM, KITCHEN TABLE
, CLOTHES PINS, INVENTED, LILACS
, HEAT, LEAVE, HOUSE
520 DATA SEND THIS MESSAGE, MADE
 THE WORLD, PROMISED,PRIMROSES,
WAGGED HIS TALE, VERY SLOW, WALK
ING TO EARTH,VERY WISE, WISHES,
FISHES, RAISED HIS LEFT FOOT,DRA
GGED HIS BODY, THROUGH THE WIND,
CRUNCHING HIS BONE
525 DATA HEARD HER,PLODDING ON,
TORTOISE, HEAP OF RUBBISH, FOR A
 BONE,BESIDE THE PATH, CUTTING,
SLOWED DOWN, FOUND, SAT DOWN, ST
ILL EATING,WINK YOUR EYE, DROPPE
D, GRAB, FROM THE GROUND,MUNCHIN
G, LOUDLY, OUT OF THE BUSH, SATI
SFIED,SO THIRSTY, VERY HOT
530 DATA WEAKER AND WEAKER, AT E
VERY BREATH, SCORNFUL LAUGH, RUN
 PAST, AN OVEN, IN HER THROAT, B
IRDS, DRINK, STREAM,CRYING, NOSI
NG ALONG, LOOKING FOR FOOD,FAINT
, PANT, REFRESHED AND STRONG
535 DATA NAKED,TOUCH,WHISTLE,PLE
ASE,MY FAMILY,FRUIT,ALL OF THEM
GIRLS, FOUR CHILDREN, WORSE THAN
 THAT, HARD WORK, IGNORED,MARRIE
D AGAIN, SPLIT APART, RANY OR DR
Y, TO SELL,GROW, THE BRIGHTEST A
ND MOST BEAUTIFUL
540 DATA COMPLAINED, MONEY TO BU
Y FOOD, IN SECRET, TEND THE GARD
EN,LOVED TO PLANT FLOWERS,NEVER
GAVE HER THE CHANCE,LOSS, NEVER
CHANGED,RED JUICY FRUIT,SEEDS
545 DATA WOKE UP, WATER THE PLAN
TS, ATE ATE ATE,SHE LOVED,SO MUC
H,BELONGED,HER CHILDREN,WANTED T
O DANCE,FULLY RIPE,SO BIG AND SW
EET,NEVER ALLOW HER,TO HAVE,SELL
, RAGED, COULD NOT SLEEP, THAT N
IGHT
550 DATA WIND,SILENCE,DAYLIGHT C
AME,CREPT,STARTED SINGING,TO LIF
E AGAIN,BRING ME,OBEY ME,POUNCE,
SHRIVELED,ASHAMED GROUND WOULD O
PEN, SWALLOW UP,KNEW VERY WELL,B
EGAN TO GROW, THEY ASKED HER
555 DATA MY BODY, FLAMES, BASKET
LOADS OF APPLES, TASTED, SMELLED
, TOUCHED, HEARD,SEE,RICHEST,GRA
BBED HER AND PULLED,SPOKE SOFTLY
, SWEET, DRY BONE,LARGE CAN, WAT
ER,CANDY, MELON, PEACH,MONKEYS,L
ITTLE MONEY, EARN A LIVING
560 DATA STRONG ENOUGH, ACROSS T
HE WATER, I LOVED, STOP, WENT TO
 THE WOODS, LISTEN, TO THE BIRDS
, ON THE ISLANDS, RIVER WAS LOW,
 CROSS SAFELY, THE BEST, EARLY M
ORNING, CUT WOOD, BABY, FISHERMA
N, FISHERWOMAN, BUSH,CRICKETS, A
 LITTLE SNAKE
565 DATA BACK YARD, JUNK YARD, P
ALM WINE, TRAP,MOONLIT,RED OIL,D
RY SEASON, RAINY, SNAPPED, TO TH
E SHORE,POUNDED,STARTED BIRD, DA
SHED,MELTING, FEARS, CANNOT FIND
, DOTTED,FARAWAY PLACE
570 DATA WOMEN SMILED, DANGER, S
TUCK OUT OF HIS HEAD, UTTER, BEL
IEVE ME, MIGHTY FIGURE, GIANT, S
OUND, WIDE OPEN, THE DOOR, A HUT
, SMILED DOWN, ASKED, WHAT HE WA
NTED, GIVE ME,EYEBALLS, LISTEN T
O ME, EXPECTING
575 DATA COULD NOT MOVE, FLEW AW
AY, RAN AWAY, CAME TO A HUT, THU
MP, SO FAR AWAY, STUMPS OF TREES
, LONG WAY TO GO, GIRAFFE, SPOTS
, STRIPES, FANCY CLOTHES, A GOOD
 GIRL,BANJO,SPRING LIKE A LEAPAR
D,WARNING, ATTIC,SHOOK THE GROUN
D
580 DATA IN THE DARK, BLOOD, MOT
HER GONE,YELLOW HOUSE, GREEN, RE
D, YELLOW, PINK, BLUE, PEARS, CO
RN, VEGETABLES, ORANGE, ORANGES,
 WATERMELON, RAISINS,PEANUTS, PO
TATOES, RICE AND BEANS, SPAGHETT
I
585 DATA LEFT, HUSH, LITTLE BABY
, BUILD A HOUSE, GUITAR, PIANO,
GO SEE, HEARTS, PLAY CARDS, PLAY
 GAMES, HOPSKOTCH, GO TO BED, DR
INK WATER, DRINK BEER, SO SWEET,
 EVIL LAUGH,NEARER, BOILED, LARG
E CAN, COFFEE, MILK, TEA, CHOCOL
ATE,JELLY BEANS
590 DATA BLINDED, LEAVES, CHATTE
R OF CHILDREN, CHATTER OF MONEY,
 GROWN UPS, GROWN UP TALK, MONEY
 BAGS, RUSHED AWAY, CLAPPED HIS
HANDS, EARS, FEET, STOMACH, BUTT
ERFLIES
595 DATA OCEAN, SAND, FEAR, DANC
ER, LEGS, ARMS, HANDS, FEET, TOE
S, 6 TOES, SWEET BEEF, STEW, COR
N MEAL, BREAD, KNIFE, FOOL, BAG
OF MONEY, COOKING FIRE, SMOKE, P
ATTER OF RAIN, BROKEN POTS
600 DATA SCREAMED, MOTHS, MOTHER
S WHO YELLED, FROM THAT TIME ON,
 NOTHING, WARNING, SEIZED BY A L
EG, TOSSED, NEVER AGAIN, RACED A
WAY, PICKED UP,WORK HARD,PLENTY
605 DATA STUMBLED INTO, MISFORTU
NE, TOO STUPID, LOST HER MOTHER,
 LITTLE,FLOWERS, PLAY, WATCH, TH
E HILLS, RIVER BANK, JUST OUTSID
E, SWIM, MIMIC, PRETEND, FROGS,
THAT HID, TINY SILVER FISH
610 DATA BELIEVES IN, CROAKING,
MANY, LIKED TO CATCH, OTHER GIRL
S, COLORED PETALS,TELL ME, KNEW
MANY, ASKING, HEARTS HEAVY, SLIG
HTEST TRACES, BUNCHES OF FLOWERS
, TINY INSECT, SKIPPING, JUMPING
, FORGOT, TOO LATE
615 DATA NEVER UNDERSTOOD, WANTE
D TO KILL, TUCKED, IN A POCKET,
WANDERED, AFRAID, TINY INSECTS,
LOSE THEIR WINGS, WING, OUTSIDE,
 HUNDREDS, NEARLY DONE, HUNTING,
 THE PATH, HOW TO GET BACK, SOON
 IT WOULD BE DARK
620 DATA START SINGING, LIGHTER,
 IMAGINE, DARK, GATHERED, CRYING
, HEARD THE SINGING, HURRYING, T
HE SAME WAY, GROWING LOUDER, HIL
LTOP, BREATHLESS, ANGRY SCOLDING
, SUN SETTING, EMBRACED, WALKED,
 SAVED
625 DATA SHINING, LEAVE IT THERE
, IN TROUBLE, TERRIBLE THINGS, W
ONDERFUL THINGS, HELP ME, FATHER
, PAPA, BROTHER, DADDY, SISTER,
MET IN SECRED, WORKED, SACKS OF
CHARCOAL, PILES, BUSH, ANIMALS,
TRICKS, TEASING, LOVED, I LOVED
630 DATA PETRIFIED FOREST,SWIM L
IKE A FISH, GLANCED, FURNACE, EA
RTH, HEAVEN, SEA, SEE ME, CELEBR
ATE, BORN, INSTEAD, STAYING A HO
ME, WENT FISHING, TALES OF SEAME
N, FRIEND
635 DATA ACRES OF GRAY, FARMING,
 COULD NOT SEE, BASHFUL, SHY, GR
EAD FRIEND, FORGIVE, LISTENED, W
RESTLING, HARDLY DARE, GAZING, C
OOKING, CANDY, RICHLY DRESSED, N
AME, INSISTED, ENVY, MARRY, CAME
 OPENLY, DID NOT WORRY, SILENT,
HOW COULD SHE CHOOSE
640 DATA THAWING RIVER, LONGED T
O DISAPPEAR, HARDWORKING, OPEN-H
EARTED, BEST, HARVEST, KIND, HOM
E TIRED, COLORED HER LIPS, OUR M
OTHERS, OUR FATHER, BODY, SLEEP
WELL, GOOD THING, BAD THING
645 DATA COLD BED, DREAMS, STOP
COMING,NO PLACE TO TALK, DUST, R
EST, WANT, BITTERLY DISAPPOINTED
, KEEP OUT, SAD, TRIUMPH, KING,
QUEEN, QUICK, GUESTS, BEER
650 DATA A USUAL MISTAKE, SINGER
S, DANCERS, PIANO PLAYER, PIZZA,
 POTATO CHIPS, ICE CREAM, LIKED
BY, LICKED BY, LOOK AT ME, WHIRL
S
655 DATA PUZZLE, HAT, COAT, THRE
E DWARVES, NEW MOON, IF I COULD,
 HIDE NOTHING, LITTLE ONE, LOOK
A LONG TIME, FELL OFF, TREE, STR
ONG BRANCHES, SWING
660 DATA BRUSH AWAY, WICKED, SWE
ET, HONEYED, LET IT FALL, BOAT,
SHIP, SAILING, SURFING, HUMAN BO
NES, A COW, LIONS, EARLY MORNING
, THE MIDDLE OF THE NIGHT
665 DATA UNDER THE CHIN, BATHE,
BY THE SNOW, RISE, HANDSOME, WIN
DOW, LADY, TUMBLE-DOWN, ONLY A H
EAD, LONG JOURNEY, HORROR, EVERY
THING SEEMED TO BE FALLING OFF,
```

```
THAT OLD HOUSE
670 DATA BEARDS, GLISHTENED, FUL
L, HALF-DEAD,RIGHT HAND, LEFT TH
EM LYING, IN THE ROAD, FIND MY W
AY, SO YOU SAY, WRONG, SHAKING,
GREAT FIRE, IRON ROD, HEAD
675 DATA STRETCHED, CONQUERED, C
HILD, ROAST, UP, COME TO SEE, YO
UR BONES, REMEMBERED, HUNTING AT
 NIGHT, TRY TO SING, EMPTY, TREM
BLE, BLACK
680 DATA SURELY WAKE,WHITE, SUSP
ICIOUS, KNITTED, ROPE, IN TROUBL
E, THROAT, EAT YOU, BOUND, LIGHT
 OF THE FIRE, WAILING, STOPPED T
O LISTEN, MOVED TOGETHER, DREW N
EARER
685 DATA DESERT YOU, FOLLOW, DRI
FTING, HAUNTED, SAVE, FOREST, AS
 FAST AS THEY COULD, GOING, TIED
 UP,ALONE,SHOT AT HIM, A TIGER,
THREE BULLETS, BOUNCED OFF
690 DATA PLAYED, NIGHTGOWNS, LON
G AND WHITE, FLOATED, STRANGE, L
ACE, SNEAKERS, WALKED SOFTLY, BU
STLED NOISILY, PIERCING SHRIEK,
A GUN, SHAKE HEAD
695 DATA CATCHES TIGERS, DEER, S
HAKE AND SHAKE, SPIDER, FLIE, BA
TS, WITCHES, VERY FAT, TOP HAT,
SLIPPED DOWN, ENOUGH TO EAT, ACC
USE, MOTHER YELLED, SO LOUD
700 DATA THE STREET, THIS PLACE,
 THIS TIME, WHERE I WAS, I DID N
OT DO IT, WILD WEATHER, MAGIC, S
OUR, NORTH POLE, STAR, NORTH STA
R, WHERE I FOUND IT, MARRIAGE,FA
MOUS
705 DATA MOUSE-TRAP, DUST, PERFU
ME, STAND OUTSIDE, LOST, HEAVY,
LIGHT, WHITE, PRINCESS, WISE, PR
ISONER, FISH, OWL
710 DATA LOOK TWICE, MORE AND MO
RE CHILDREN, WILD DEER, WANDERER
S, SO THIN, SUGAR CANE, AWKWARD,
 SILLY WOMAN, SILLY MAN, WISE WO
MAN, DARK, HE HAD TEN CHILDREN
715 DATA PRIZE, SOFTER, WILD, HO
MELESS, FED, PARENTS, MY DAUGHTE
R, MY SON, GONE FOR YEARS, WELCO
MES, ONLY CHILD, HOUSE, WINDBLOW
N, LAST ONE, COOKIES
720 DATA LIKE AN OAK, SHE STOOD,
 BENEATH THE MOUNTAIN, THICK BRA
NCHES, STARS IN MILLIONS, WARM E
MOTION, SPREADS HER RAYS, TIS NO
T FOR HER
725 DATA TIS NOT FOR HIM, MOONRI
SE, WHEN THE BIRDS GO, SWEETEST
THING, ACORN, FRAGRANCE, POOREST
 LEAF, SLENDER LACE-LEAFED BRANC
HES
730 DATA WHIRLWINDS, HIDDEN NEST
, HONEY-SWEET, HAIR DOWN-STREAMI
NG, LIGHTS PAINTING, SUN DRIED,
BLEACHING, SOLFTLY ROUNDED, PEAC
H, PEAR, PLUM
735 DATA HIGH WHEELED WAGONS,FRE
IGHT, RICH VINE, CHICKENS, RANCH
 FOLK, CAMP, BIRDS, BEES, COTTON
WOOD TREE, SHALLOW WELL, SHEPARD
740 DATA SNATCHED A LITTLE FOOD,
 SMALL CIRCLE, SLOW MOVING, GUAR
DIAN, NIGHT HAWK,VALLEY, FROM TH
E WORLD, SHUT IN, GOLDEN
745 DATA FAIRY FLUTES, DRAGONFLY
, PEACH LEAF BOAT, WHERE THE WIN
D, TALL-LEAVED STALK, BLOOMS TWI
CE, HONEY THROATED CALL
750 DATA HUMAN LONGING, TENDERNE
SS, SUCKLING CHILD, BREASTSFULLS
 OF MILK, SLOWLY BURNS, GARDEN D
IRT, COWMEN, MILKING, BUTTER
755 DATA A SMALL PUMPKIN, CATCH
IT, SMOOTH AND FINE, NUTMEG AND
GINGER, PLEAD, TO ANTELOPE, CRUM
BLING ROCK, VERY BLUE, BLUE CORN
760 DATA FROM THE NORTH, THIS WA
Y, INSIDE THE CLOUD, VERY YELLOW
, COMES THE CLOUD, TEARS, SHOOK
AND TWISTED, JUMPED AND DANCED,
BARE SKULL, SHAKING, BEST
765 DATA GETTING HUNGRY, RAIN, G
OD, WIND, CHOKE, YOU, ME, EVERYO
NE, YEARS, UNEXPECTED, LARGE RED
 HEN, CROWS, BLACKBIRDS
770 DATA IN THE CITIES, I BECAME
 A STONE,BACKWARDS AND FORWARD,
GREY, LILAC, ALL THE COLORS, SHA
KE IT THIS WAY, MUCH TO HOT, COO
K, JOKED, TAKE A HINT
775 DATA THICK SMOKE, MENDED CLO
THES, BROKEN TEETH, TORN, POOR,
READY, WHERE ARE YOU GOING, MANY
 CHILDREN, FAVORITE, MY CHILD,OP
EN
780 DATA BACKYARD, PICK A FRUIT,
@
```


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A multi-purpose text utility for OS-9

Append

by Stephen B. Goldberg

When you want to add a name to your telephone list, wouldn't it be nice to just enter it without having to run your word processor, editor or database program? That is the original purpose of *Append*. It works nicely, but the program has grown into a multi-function utility that can also be used to replace the `build` and `merge` commands. The general syntax for *Append* is

```
append <destination> [source] [...]
```

To add lines to the end of a text file, type `append` followed by the name or pathlist of the file being appended and press ENTER. When the plus sign (+) prompt appears, type the line(s) you want to add, pressing ENTER after each. When you are finished, press ENTER by itself at the + prompt. Here is an example:

```
OS9: append fone ENTER
+ john jones (123) 456-7890 ENTER
+ philip smith (493) 293-4832 ENTER
+ ENTER
```

This adds the telephone numbers of John Jones and Phillip Smith to the end of an existing file named `fone`. When you execute the program, if the file `fone` doesn't exist, *Append* automatically creates it. In this case it functions exactly like the `build` utility. It even uses the ? prompt in place of the plus sign.

Putting Two and Two Together

If you want to merge several files into one large file, use a command line like

```
OS9: append big_fone family
business friends ENTER
```

Stephen Goldberg is a dentist and the author of the Utilipak *series of OS-9 utilities. He can be contacted at 695 Plainview Road, Bethpage, NY 11714. Please include an SASE when requesting a reply.*

OS-9

Listing 1: `Append.asm`

```
**************************************************
*
* Three in One
* Written by Stephen Goldberg
* Copyright (c) January 1990
* By Falsoft, Inc.
*
* APPEND
*
* Adds text to end of a text file from the keyboard or
* other files.  Also replaces Build and Merge utilities.
*
* Use: append <destination> [source] [...]
* Omit source filename for keyboard input.
* Hyphen (-) given as source filename accepts data from
* unprompted standard input (pipeline or redirection).
*
* Use `#' command line modifier for faster operation.
*
         ifp1
         use   /dd/defs/os9defs
         endc
*
         mod   len,name,prgrm+objct,reent+2,entry,dsiz
*
flag     rmb   1              prompt flag
inpath   rmb   1              input path number
outpath  rmb   1              output path number
```

```
buffsiz  rmb   2              size of buffer
pointer  rmb   2              filename pointer
buffer   rmb   512            buffer
         rmb   200            stack
         rmb   200            parameters
dsiz     equ   .
*
name     fcs   /Append/
         fcb   3              edition number
         fcc   /(c) January 1990 Falsoft, Inc./
         fcc   /Written by Stephen B.Goldberg/
*
syntax   fcc   /Use: append <destination> [source] [...]/
         fdb   $070a
         fcc   /     use - as source for standard input/
cr       fcb   $0d
*******************************
* SYNTAX ERROR PROMPT
*******************************
bad      leax  <syntax,pcr    syntax prompt
         lda   #1             standard output
         ldy   #100           maximum length
         os9   i$writln       prompt to screen
         lbcs  out            exit with error
         lbra  noerr          exit append
*******************************
* INITIALIZE
*******************************
entry    decb                 parameter?
         beq   bad            no, prompt and quit
         stu   buffsiz        lower data limit
         tfr   x,d            top data limit
         subd  buffsiz        total data size
         subd  #206           less stack and other data
         std   buffsiz        save buffer size
         clr   inpath         standard input path
         clr   flag           clear prompt flag
*******************************
* OPEN DESTINATION FILE
*******************************
         stx   pointer        save parameter pointer
         lda   #write.        write mode
         os9   i$open         open destination file
         bcc   savepath       no error, continue
         cmpb  #216           can't find file?
         lbne  cantopen       prompt and exit with other error
         ldx   pointer        pointer to filename
         ldd   #$020b         write mode and attr pr r w
         os9   i$create       create new file
         lbcs  cantopen       prompt and exit with error
         inc   flag           set `?' prompt flag
pramloop ldb   ,x+            next parameter character
         cmpb  #$20           space?
         beq   pramloop       yes, look for next parameter
         leax  -1,x           reset pointer
savepath sta   outpath        save output path number
         stx   pointer        save parameter pointer
*******************************
* GO TO END OF DESTINATION
*******************************
         pshs  u,x            save registers
         ldb   #ss.size       file size function
         os9   i$getstt       get length of file
         bcs   out            exit with error
         os9   i$seek         move to end of file
         bcs   out            exit with error
         puls  u,x            retrieve registers
*******************************
* OPEN SOURCE FILE
*******************************
         lda   ,x+            next parameter characters
         cmpa  #$0d           more parameters?
         beq   chkflag        no, use prompt for keyboard entry
         com   flag           yes, set no-prompt flag
         cmpa  #'-            standard input path?
         bne   openin         no, open first source file
```


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OS-9 is a trademark of Microware Systems Corporation and Motorola Inc. MS-DOS is a trademark of Microsoft Corp. FLEX is a trademark of TSC, Inc.

This command creates the file big_fone and merges the telephone numbers from the three specified files (family, business and friends) into this file. If big_fone already exists, the contents of the three source files are added to the end of its original contents.

Append works nicely, but the program has grown into a multi-function utility that can also be used to replace the build and merge commands.

Any type of file can be merged in this manner, including OS-9 memory modules. You can also use *Append* to merge data from a pipeline or by input re-direction. For example, to add the telephone numbers in a compressed file to your fone file use

```
OS9: expand old_fone ! append
fone - ENTER
```

This example assumes you already have the expand utility on your system. The expand program enlarges the compressed file old_fone to the standard output path. This is piped to append, along with the destination file, fone. When used in place of the source filename, the hyphen (-) tells append to accept data from the standard input path without prompts and not to quit at a bare carriage return.

When using *Append* in a mode other than keyboard input, increase the size of the default 512-byte buffer by using the # command line modifier. This increases the speed of operation when appending large files.

```
OS9: append hugefile bigfile
largefile #40k ENTER
```

If you don't have the OS-9 assembler, enter and run the BASIC09 program in Listing 2 to generate the executable program. After a little experimentation, you'll find many uses for *Append*. ❑

```
chkloop  lda   ,x+           next parameter character
         cmpa  #$20          end of parameters?
         blo   chkflag       yes, check for prompt
         beq   chkloop       not yet, look some more
openin   ldx   pointer       parameter pointer
         lda   #read.        read mode
         os9   i$open        open source file
         bcs   cantapnd      prompt and quit with error
         sta   inpath        save input path number
         stx   pointer       save parameter pointer
*******************************
* DATA TRANSFER LOOP
*******************************
chkflag  leax  <quest,pcr    `?' keyboard prompt
         tst   flag          prompt wanted?
         bmi   bigin         no, get block input
         bne   doprompt      yes, use `?' prompt
         leax  <plus,pcr     else use `+' prompt
doprompt lda   #1            standard output
         ldy   #2            two characters
         os9   i$writln      prompt to screen
         bcs   out           exit with error
         leax  buffer,u      buffer address
         clra                standard input path
         ldy   #200          maximum line length
         os9   i$readln      get line from keyboard
         bcs   error         branch on error
         cmpy  #1            carriage return only?
         beq   noerr         yes, end append
bigout   lda   outpath       destination path number
         os9   i$write       output to file
         bcc   chkflag       if no error, get next input
error    cmpb  #e$eof        end of file?
         bne   out           no, quit with other error
         lda   inpath        input path number
         beq   noerr         standard input, quit append
         os9   i$close       close input file
         bcs   out           exit with error
         ldx   pointer       parameter pointer
         lda   ,x            next parameter
         cmpa  #$0d          another input file?
         bne   openin        yes, get it
noerr    clrb                clear error flag
out      os9   f$exit        end append
*
quest    fcc   /? /          keyboard input prompt
plus     fcc   /+ /          keyboard input prompt
*******************************
* BLOCK INPUT
*******************************
bigin    ldy   buffsiz       buffer size
         leax  buffer,u      buffer address
         lda   inpath        input path number
         os9   i$read        read in block
         bcs   error         branch on error
         bra   bigout        block to destination file
*******************************
* ERROR MESSAGES
*******************************
cantapnd leax  <noappnd,pcr  can't append message
         ldy   #noapplen     message length
         bra   badinput      to screen and quit with error
cantopen ldx   pointer       parameter pointer
endloop  lda   ,x+           filenam character
         cmpa  #$20          end of filename?
         bhi   endloop       no, look some more
         lda   #$0d          yes, carriage return
         sta   -1,x          to end of filename
         leax  <noopen,pcr   can't open message
         ldy   #noopelen     length of message
badinput bsr   screen2       message to screen
         ldx   pointer       parameter pointer
         bsr   screen        filename(s) to screen
         bra   out           exit with error
*
screen   ldy   #200          maximum length
```

```
screen2  lda   #2            standard error path
         os9   i$writln      message to screen
         bcs   out           exit with error
         rts                 return
*
noappnd  fcc   /**** Can't append: /
noopen   fcb   7
noapplen equ   *-noappnd
         fcc   /**** Can't open: /
noopelen equ   *-noopen
*
         emod
len      equ   *
         end
```

Listing 2: Make_Append.b09

```
PROCEDURE Make_Append
 0000       DIM ByteVar,OutPath:BYTE
 000B       DIM Counter,Checksum,LineNumber:INTEGER
 001A       DIM ByteString:STRING[2]
 0026       DIM DataString:STRING[60]
 0032
 0033       CREATE #OutPath,"Append":WRITE
 0044       LineNumber=100
 004B
 004C 10    READ DataString
 0054       Checksum=1
 005B
 005C       FOR Counter=1 TO 25
 006C         ByteString=MID$(DataString,Counter*2-1,2)
 0080
 0081         IF ByteString="ZZ" THEN
 008F           GOTO 20
 0093         ENDIF
 0095
 0096         ByteVar=VAL("$"+ByteString)
 00A4         PUT #OutPath,ByteVar
 00AE         Checksum=Checksum+Counter*ASC(ByteString)
 00BF         Checksum=Checksum+Counter*ASC(RIGHT$(ByteString,1))
 00D3       NEXT Counter
 00DE
 00DF 20    IF VAL("$"+RIGHT$(DataString,4))<>Checksum THEN
 00F8         PRINT "Check error in line "; LineNumber
 0114       ENDIF
 0116
 0117       LineNumber=LineNumber+1
 0122
 0123       IF ByteString<>"ZZ" THEN
 0131         GOTO 10
 0135       ENDIF
 0137
 0138       CLOSE #OutPath
 013E       END
 0140
 0141 100   DATA "87CD01D3000D1182F900B4039741707065 6EE403286329204A8919"
 0181 101   DATA "616E756172792031393930204661 6C736F66742C20496E632E8B26"
 01C1 102   DATA "5772697474656E20627920537465 7068656E20422E476F6C648B58"
 0201 103   DATA "626572675573653A20617070656E 64203C64657374696E6174897D"
 0241 104   DATA "696F6E3E205B736F757263655D20 5B2E2E2E5D070A202020208A17"
 0281 105   DATA "20757365202D20617320736F7572 636520666F72207374616E88A6"
 02C1 106   DATA "6461726420696E7075740D308CAB 8601108E0064103F8C102589EC"
 0301 107   DATA "00B51600B15A27EADF031F109303 8300CEDD030F010F009F058D49"
 0341 108   DATA "8602103F84241CC1D8102600AF 9E05CC020B103F83102500A38A8D"
 0381 109   DATA "0C00E680C12027FA301F97029F 053450C602103F8D256E103F8C57"
 03C1 110   DATA "8825693550A680810D271B0300 812D2608A6808120250F27F889B0"
 0401 111   DATA "9E058601103F84255F97019F 05308C460D002B46260330 8C3F8AD0"
 0441 112   DATA "8601108E0002103F8C252F30474F108E00C8103F8B250D108C8CB2"
 0481 113   DATA "0001271C9602103F8A24D0C1D32612960127 0D103F8F25099E8C60"
 04C1 114   DATA "05A684810D26AE5F103F063F202B20109E033047960110 3F898955"
 0501 115   DATA "25D720CE308C2D108E001420139E05A680812022FA860DA71F8D50"
 0541 116   DATA "308C2B108E00128D0A9E058D0220C7108E00C88602103F8C258BB4"
 0581 117   DATA "BC392A2A2A2A2043616E27742061707065 6E643A20072A2A2A8A4E"
 05C1 118   DATA "2A2043616E2774206F70656E3A20E7DF59ZZ4414"
```

Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful, helpful and fun for other CoCo owners.

WHAT TO WRITE: We are interested in what you want to tell our readers. We accept for consideration anything that is well-written and has a practical application for the Tandy Color Computer. If it interests you, it will probably interest lots of others. However, we vastly prefer articles with accompanying programs that can be entered and run. The more unique the idea, the more the appeal. We have a continuing need for short articles with short listings. These are especially appealing to our many beginners.

FORMAT: Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs and debug our typing errors. All programs should be supported by some editorial commentary explaining how the program works. We also prefer that editorial copy be included in ASCII format on the tape or disk, using any of the word processors currently available for the Color Computer. Also, please include a double-spaced printout of your editorial material and program listing. Do not send text in all capital letters; use upper- and lowercase.

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For the benefit of those wanting more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submission Guidelines, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

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Game CoCo 3

Space Ace

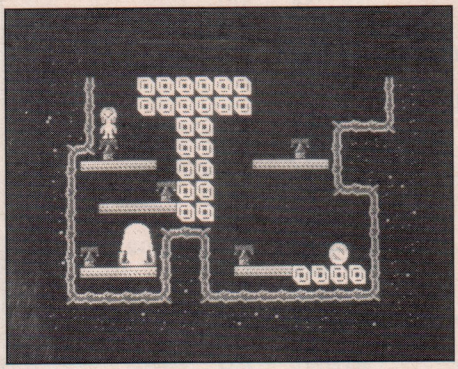
Space Ace is an action-arcade game written for the 128K or 512K CoCo 3. Requirements for operation include a disk drive and a joystick. Although it looks acceptable on a color composite monitor, *Space Ace* looks great on an RGB monitor. The game is written in 100-percent machine language and has smooth Hi-Res graphics as well as fast action. It's supplied on a single, unprotected 5¼-inch disk and comes with three and a half pages of simple instructions. To begin playing, enter `LOADM "X1":EXEC`.

Space Ace is the story of a friendly computer turned bad. It all transpired during a period of several hundred years when the galactic master computer, Iravo, began creating robotic drone guards and mercenaries. You are *Space Ace*, a human dressed in a robot suit. This disguise was necessary to infiltrate the starbase and destroy Iravo. Iravo has successfully taken over all four galaxies whose inhabitants now live a fearful existence in slave colonies. As Ace, you must rescue these people. To accomplish this task, Ace has an Iravo Class-2 Scout spaceship with various weapons, and the knowledge to complete this very dangerous mission.

A countdown starts at 10 and decreases after the loss of every third life. If the countdown reaches zero, you must start over. These 30 lives seem generous, but you will soon discover this mission's complexity. On this mission you are confronted by drone guards, orbs and power orbs. Use the joystick to maneuver through the four zones in the starbase. (A self-centering joystick is highly recommended.) Each zone contains computer terminals and is divided into rooms. Walk to the edge of the screen to enter the next room. Rooms above or below the playing screen are accessible with elevator platforms.

Throughout the mission there are several screen options from which to choose. Scan searches your remaining orbs. This option can be used only from certain terminals. You must discover the exact terminals. Be warned, some orbs are deadly when scanned. Item selects the weapon you want activated. Call shows your score, number of lives left and power level. Quit resumes play.

Other items of interest include power orbs, lasers and telepod keys to instantly go from zone to zone. A Super Jump command is also available for high jumps. The anti-explosion device prevents orb explosions during scanning. Be careful not to fall or jump into outer space. To win the game you must explore the entire starbase, find the needed orbs and gain access to the master computer. In addition to Pause and Continue features, *Space Ace* includes a Game Save so you can get some rest and resume play after a good night's sleep.



Space Ace is quality fun. It's full of unexpected thrills and situations that will leave you breathless. The graphics and sound effects are good, though game play is slowed down slightly when going from one room to another.

(Biware Enterprises, c/o Kandi Stinson, P.O. Box 265, Allen, OK 74825; $20)

— Robert Gray

Utility CoCo 3

Scripteller

I was asked to review a new program for handwriting analysis. This was my chance to play graphologist and discover the hidden messages conveyed through handwriting. I chose to study my co-workers. What are these people really like? As the first of these analyses began, I was filled with anticipation as to what I would learn.

Scripteller is a program for handwriting analysis on the CoCo 3 with a disk drive. The program is easy to use and is designed to give a general psychological portrait of a person from a sample of their writing. The package includes an instruction manual that clearly states the directions for and purpose of this program. The claims made in this manual are of limited greatness. The program claims to approach the accuracy of the expert graphologist, but cannot accept responsibility for inaccurate interpretations due to the possibility of inaccurate user responses.

To run the program, type `RUN"S"` and ENTER. It really is that simple. This program is perfect for the computer novice or the genius whose brain needs a vacation. The menu offers five options: analyze, load, save, interpret and quit. To analyze a handwriting sample, select Option 1 and answer the series of questions that follows. Examples of questions include the size, slant and width of the writing, the width of both left and right margins, space between lines of writing and the way the subject dots the i. When the analysis has ended, you are prompted to press ENTER to return to the menu. From here you can select any of the remaining options. To interpret the information, select Option 4. The results of the analysis can be viewed either on the screen or in printed form.

The interpretation lists the handwriting factors and the corresponding personality characteristics. These characteristics are generated from the answers given in the analysis and should vary based on these answers. I repeat, they *should* vary based on these answers. During my experimentation, some of these computer-generated characteristics remained the same regardless of the response to the corresponding question. I am also puzzled by the combined characteristics that appear at the end of the interpretation. In my analyses these characteristics varied in number from one to five. And, with my limited knowledge of graphology, seemed nothing more than randomly generated personality characteristics with little relationship to the preceding information.

Some of these interpretations, like "average in many ways" and "normalcy" are neither complimentary nor derogatory, but remain in a plane of unexplained ambiguity. Other interpretations such as "energetic and flexible," "polite" immediately followed by "selfish" and "sensuality, exaggeration" are contradictory groupings that further obstruct the view to one's personality. Based on my experience with this program, I recommend *Scripteller* be used strictly for entertainment and not as irrefutable evidence in a courtroom. I can see no application for this program beyond its capacity for limited entertainment.

Scripteller is not the re-invention of the

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wheel. It is not perfect. It does not push computer technology to new and unexplored limits or require users with intellectual superiority. It operates without bright colors or spectacular graphics. There are no warriors, damsels, dragons, castles or moats. Just an unassuming program quietly demanding the attention and respect given to its dazzling cousins. *Scripteller* is proof that entertainment need not be all flash and pizazz.

(E.Z. Friendly Software, 118 Corlies Avenue, Poughkeepsie, NY 12601; 914-485-8150; $26.95 plus $1.50 S/H)

— Rob Moore

Software	CoCo 1, 2 & 3

T&D Software *Issues #91 & #92*

Are you a newcomer to the CoCo world, bright-eyed and full of curiosity about what this sleek machine is capable of? Or are you a seasoned CoCo user, thoroughly familiar with word processors and databases and perhaps even BASIC? No matter what your level of experience, there's a product from T&D Subscription Software that may add variety (and a few surprises) to your computing life.

Twelve times a year, T&D Subscription Software releases a disk and cassette filled with CoCo 1, 2 and 3 programs. Each disk/cassette provides a collection of different programs that offer everything from help for the CoCo user, to general instruction, to just plain fun.

Included are business and personal productivity programs, instructional tutorials, CoCo utilities, game puzzles, text and arcade-style games, as well as educational programs for children. All the subscription programs are original (i.e., none of them come from public domain software). Disks/cassettes may be ordered individually (all issues are still available), or you may sign up for a year's subscription that includes twelve disks, one per month, at a discount off the single-issue price.

While some T&D Subscription Software programs require a disk drive, the cassette tape issues still include these programs for users who may eventually upgrade to a disk drive. My review examines last year's first two disk issues: #91 (January 1990) and #92 (February 1990).

Each T&D Subscription Software disk comes labeled with a directory of its contents and includes a page of instructions. T&D tells me that with each order it includes an additional page of instructions to help beginners get started. I found it easy to get the programs up and running as soon as I made disk back-up copies and safely stored the originals.

Both issues have 10 different programs, all written for the CoCo BASIC environment (none of the programs can be used directly under the OS-9 operating system). By typing `RUN"DIR"`, you engage a directory utility program that comes with each T&D Subscription Software disk. This helpful program creates a listing of programs on disk, and it allows you to select and run programs with just a few keystrokes. With documentation in hand, I found it a simple matter to locate programs in the disk directory and relate them to their place in the instructions. The instructions include an explanatory paragraph for each program, with each paragraph labeled for quick reference. If you require further instructions, many programs include onscreen instructions that are viewed from within the program itself.

With all these programs before me, I had a difficult time deciding which one to run first. I ran a BASIC program called *Address It*. This is a menu-driven tutorial for the 32-column screen that addresses the question of addresses: What are the proper forms of addresses for 107 different public officials? The program contains eight pages of information accessible from a two page menu. Next I tried a BASIC game puzzle called *Solitaire*. This *Othello*-like puzzle involves strategically maneuvering around different colored chips on a grid. It is a simple but seductively challenging game. I then tried a personal productivity program, *Builder's Helper*, which allows you to add, subtract and multiply feet, inches and fractions of an inch.

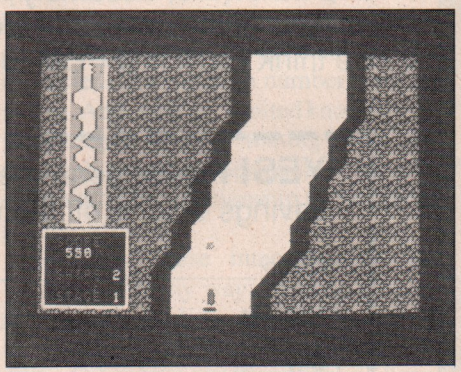
Next I discovered somewhat more elaborate programs. For instance, *Business Starter* is a menu-driven program that assists you in creating and printing out a business plan; it even offers advice for seeking a bank loan. Another fancy program is a database for keeping track of a baseball card collection. In addition, I found a very educational tutorial that outlines the differences between IBM PC BASIC and CoCo BASIC. Among the games are several all-text, adventure-style games, plus a number of arcade-style games (including a Tom Mix creation called *Sky-Way*) that require quick reflexes.

Each program I tried is simple, to the point, and in all cases performs as advertised. The breakdown of the programs in my two issues went like this: With ten programs apiece, each disk averaged six games, two tutorials, one productivity aid and one CoCo utility. On the average, two programs require a 128K CoCo 3, while many others require a minimum 32K to run. A joystick is required to play some of the games. In all cases documentation is very thorough regarding program requirements. While you need a CoCo 3 with an RGB monitor and disk drive to run *all* the programs to their fullest potential, for most programs, a tape-based 32K CoCo 1 with a television monitor is adequate.

Technically speaking, these two issues contain programs that are an even mix of routines written entirely in BASIC (DECB) and BASIC programs that use ML subroutines. Two of the programs are all machine language. Both disks have basically the same distribution of software, each containing programs for CoCo 1, 2 and 3.

Overall I am impressed with this software-subscription service. Most of the programs are short and simple, yet they are useful, entertaining and cleverly written. All the programs live up to a high level of quality and reliability — obviously they were carefully selected and reviewed by T&D Subscription Software prior to release. The documentation is well-written and to the point, with unwavering attention to important details.

Being basically satisfied with the whole T&D Subscription Software package, the only reservation I have is that some of these programs are so simple, I question their usefulness. One such program is a word/picture association quiz that displays PMODE drawings of various wild animals (at times hard to identify because of poor framing). You are to select the appropriate animal name. It isn't clear what age or skill level this quiz is targeted for.



Regarding the games, I think some (especially the arcade-style games) run intolerably slow and are hard to control accurately with a joystick. A few games ask at the beginning if you want the CoCo 3 high-speed poke, but even these are slow runners. Helpful features such as game pause and move cancel are often omitted, and none of the games are written to save scores to disk — a feature I find important for any game. Regarding programming, the

only flaw I found (and a minor one at that) is that some programs did not load properly from the DIR utility. (I simply loaded and ran them from BASIC.)

On the up side, T&D Subscription Software is a very rich resource for the budding BASIC programmer. Since many of the programs are written entirely in BASIC, they can be loaded and listed like any standard BASIC program. Here is an opportunity for the programming student to study the work of programming professionals (keeping in mind of course that no copyrighted program may be copied in whole or in part and resold without the author/copyrighter's permission).

Even with my limited programming abilities, I found it easy to reconfigure some of the BASIC programs for my CoCo 3, RGB system. I used the CoCo's built-in EDIT command to adjust a program's screen colors, and insert ON BREAK GOTOs and high-speed pokes where appropriate.

T&D Subscription Software offers a little something every month for everyone; however, don't expect to find elaborate, heavy-duty spreadsheets or complex, lightning-fast arcade games. This is definitely compact, single-purpose software territory. But at the very reasonable, non-subscription price of $8 per issue, you're bound to get more than your money's worth.

(T&D Subscription Software, 2490 Miles Standish Drive, Holland, MI 49424, 616-399-9648; $8 per issue, $70 for a one-year subscription)

— Walter Myers

Database CoCo 1, 2 & 3

Mailman

With the many advances in computer technology in the last few years, it is easy to lose sight of the more mundane tasks we can relegate to the computer. How many of us slave over handwritten addresses for greeting cards during the holiday season? *Mailman*, a mailing-list organizer from Johnson Software, is a no-frills workhorse that puts that task on the CoCo where it belongs.

Of course, addressing greeting cards is just one of many chores for *Mailman*. This type of program may be even more useful to those with small businesses or organizing mailings for churches, clubs and other groups. Although the program is designed for mailing purposes, it incorporates a free-form database structure. You can use *Mailman* for many other filing tasks as well.

Mailman is a series of related programs that works on any CoCo with Extended BASIC, at least 32K RAM and a disk drive. As sold, the system is set up to run on a CoCo 3 with one drive and a printer set at 600 baud. Reconfigure the system for your CoCo setup by making simple changes to a BASIC driver program. These changes are well-documented in the 35-page manual that accompanies *Mailman*.

After running the driver program, you are greeted with a short menu. From here select options for Printer Output, File Management and Record Management.

The File Management menu allows you to add, delete and copy files. Use the Add option to create your own mailing list or database record forms. Each record in a file may contain up to 1530 characters. Once you have created the new file, pressing CLEAR takes you back to the main menu. CLEAR is *Mailman*'s hot key for breaking out of a function or returning to previous menus.

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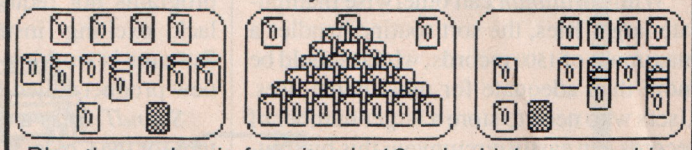

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To add data to a created file, select the Record Management option. A new menu appears with options to add, order (sort), scroll through, delete and insert records. You can also fetch a single record from a file for reference or editing.

The Add, Edit and Insert modes bring up a free-form screen on which you enter the data. This full-screen editor works well as an input device. I did, however, find the omission of an editing Insert function a little disappointing.

Mailman allows you to sort records alphabetically, by postal ZIP code or by date. When sorting alphabetically, the program starts at the first character of each record and moves on. When sorting by ZIP code, or a user-defined five-digit sorting code, *Mailman* first goes to the end of the record. It then searches backward for the first complete five-digit number, which it uses to sort. Since the free-form records don't use traditional fields, you must take care that the ZIP code, or other sort number, is the last five-digit number in each record. This is limiting in some cases and desirable in others. However, an obvious drawback to this arrangement is that Canadian addresses cannot be sorted correctly by ZIP code. Nine-digit extended U.S. ZIP codes work fine except that the last four digits are not sorted correctly. Because of the methods used and the limitations of BASIC, sorting speed is not impressive. It took four minutes to sort a file of 69 records.

While *Mailman* can otherwise manipulate larger files, the sort routine handles a maximum of 1500 records, which should be more than adequate for most home uses. Users who need to store a larger number of records can easily circumvent this by splitting mailing lists or databases into logical groups of records.

Mailman's printing capabilities are excellent. Since the system doesn't use special control codes, most any printer can be used for output. The Repeating Record feature allows you to enter a single record to be printed along with each record from a file. This practical feature is great for printing a return address on labels.

Other print features include right justification and left margin adjustments, multiple prints and the ability to print all, or a limited range, of records. You can also set the top-of-form code, which is the number of printed lines to put on a given form. If you are printing on six-line labels, you should be able to enter 6 for this value. (A standard page allows 66 lines.) Unfortunately, due to what I believe is an error in logic, I had to enter 7 to print on six-line labels and 13 for 12-line labels. A quick program change should be all that is necessary to eliminate this problem.

The Print At Record Entry (PARE) feature allows you to print a record (and a repeating record, if desired) when the record is entered into the file. This eliminates the need to call *Mailman*'s Printer Output menu separately. Those in a product-oriented business will find this time-saver quite handy.

All in all, I was impressed by *Mailman*'s capabilities. The manual includes an excellent tutorial, as well as technical information on all features. I encountered no bugs or problems other than the previously mentioned top-of-form inaccuracy.

Mailman isn't flashy and uses no special effects. It just does the job it was designed to do; make life, or work, a little easier for its users.

(Johnson Software, P.O. Box 92, Dayton, OH 45449; 513-866-2601; $23.95 plus $2.50 S/H)

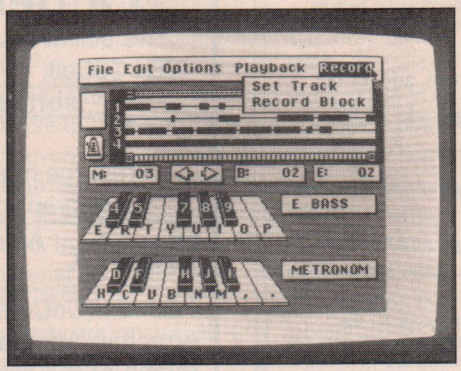
— Cray Augsburg

Music CoCo 3

SoundTrax

There are many CoCo music programs on the market. Several of these programs require a MIDI-compatible keyboard to enhance sound quality. Some of the music programs not requiring a MIDI interface lack exciting instrumentation. Sundog Systems is working to fill this void with a new product called *SoundTrax*.

SoundTrax is a sound-sequencing system for the CoCo 3. With a CoCo 3, a disk drive and a mouse or joystick, you can create lively compositions.



SoundTrax boots from any drive. The program features a graphics user interface (GUI) consisting of five pull-down menus, a four-track composition field, measure and block boxes, two keyboards with voice display boxes, a play mode indicator and a metronome box.

First, load the voices into memory. A variety of voices are available for use from the flip side of the *SoundTrax* program disk. Select the appropriate voices and load them individually using the Load Voice option in the File pull-down menu. After loading all necessary voices, you can select Save Config. If the config file is named DEFAULT.CFG, the selected voices will be loaded every time you boot *SoundTrax*. This option saves a lot of time.

With a 512K system it's possible to load all of the supplied voices into memory. Memory limitations prevent operation of this feature with a 128K computer. Save needed voices with the above-mentioned Config option. When you select a song to play, all the voices needed to recreate the song are automatically loaded. If the voices can't be found on the default drive, you'll be prompted to change to the drive where these voices reside or you can insert the voice disk into the default drive and click on the drive number.

You are probably wondering how to create music with this program. *SoundTrax* is a four-track recording environment. Two voices can be recorded at once to the same track or to separate tracks. Pick an instrument voice from the upper keyboard and one from the lower keyboard. These keyboards have preassigned keys, each spanning one full octave. Notes from either can be played on the CoCo keyboard.

After selecting a block, length of measures and the destination track numbers for both upper and lower keyboards, the music entered on your CoCo keyboard is recorded. Choose a time signature. Also, a metronome keeps the beat in accordance with the tempo.

I started a back beat with a rock-snare drum and bass guitar. The drums were recorded to Track 1 and the bass guitar to Track 2. I then merged both tracks to Track 1. Erasure of Track 2 allows for the recording of a new voice. By merging tracks it becomes possible to have many voices (polyphonic) in one song.

Selecting new voices for the keyboards allows for more voices in your recording. Supplied on disk are voices for piano, guitar, bass, horn, drums, wind instruments and many other useful sounds. The sound quality of these voices is much better than I expected. More instrument sample disks are available from Sundog Systems. Sample these voices by loading them into the keyboards and selecting Playthrough from the Options menu.

SoundTrax supports files created with *Studio Works* and interpolates the rate automatically. It can also read sounds from other sources as long as the files are no larger than 16K.

Your recording is displayed in a compo-

sition field containing all four tracks. Music is represented by broken lines in the associated tracks. It requires adjustment to read music in this format rather than the usual stave. Writing music with *SoundTrax* reminded me of past experiences programming drum machines. Programming is done mostly by ear and not by sight. You can see where music is located, but not the specific notes being played. Once familiar with the layout, though, things run smoothly.

Recording every track to perfection is difficult; at least it was for me. There are editing commands to reshape your compositions. Block editing commands include Copy, Paste, Erase, Add, Set and Cut Block. Add lets you add measures to an existing score. Track editing commands include Merge, Erase, Copy and Sync. Sync will try to put a track in closer synchronization with the metronome. It's advisable to copy the block to the clipboard before editing to ensure that all is not lost if the results of a new mix are not acceptable. The manual provides a tutorial to get you started.

SoundTrax is very entertaining. If you're not in the market to purchase a MIDI keyboard to use in conjunction with a CoCo music program, give *SoundTrax* consideration. The price is affordable for most CoCo users. Here's another outlet for your creativity on those cold winter nights. Maestro, music please.

(Sundog Systems, P.O. Box 766, Manassas, VA 22111, 703-330-8989; $34.95 plus $2.50 S/H)

— Tony Olive

Utility 512K CoCo 3

512K Copy Utility

Are your fingers sore from copying files to a new disk? Tired of waiting for a backup to finish? Have you ever wondered if there's a faster way to format disks? With *512K Copy Utility* from Carl England you can spend more time using programs, rather than wasting all day moving them.

If you use BASIC's COPY command to transfer files to new disks, then you routinely type source filename and destination filename. Moving one file at a time is tedious work. *512K Copy Utility* allows tagging of multiple files resulting in quicker transfers.

A configuration program is provided so you can set default parameters for this utility. Defaults can also be changed from within the main program.

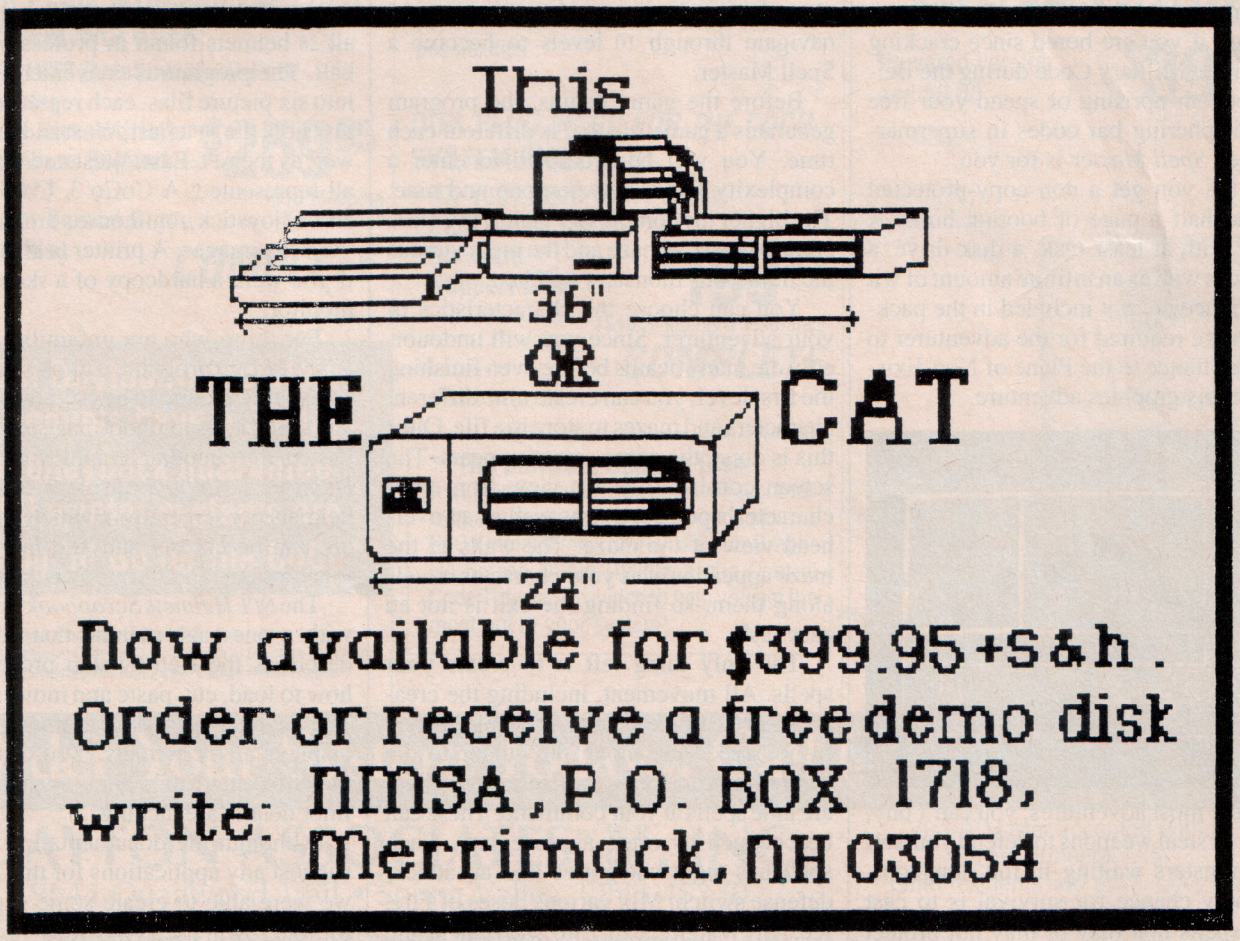
Select a source drive by pressing S and then 0, 1, 2 or 3 accordingly. Do the same for the destination drive by pressing D and a drive number. Pressing the space bar on the desired file places an asterisk in front of the filename. Use the arrow keys and move the on-screen cursor to mark additional files. Pressing ENTER executes the copying. Options also exist for copying all files and copying all files except tagged files. Files are loaded into RAM prior to being copied. Single-drive users are given a prompt to swap disks.

512K Copy Utility alleviates typing of file names. When files need to be renamed, pressing R allows you to change selected characters positioned above the cursor in an existing filename.

A word of caution: This utility allows copying of identical filenames to the destination disk. Identical filenames should be changed so that BASIC can distinguish between them.

Copying between different track drives is no problem. The destination drive can be set for 35, 36, 40 or 80 tracks. It isn't neccessary to set the number of tracks for the source drive.

You can kill files by pressing K and



format disks by pressing F. Safety prompts confirm these commands before they are executed. Formatting disks using *512K Copy Utility* is 25 percent faster than with DSKINI.

The commands for this program are easy to remember. There is hardly any learning curve to speak of. One minor option is not listed in the manual. After you load the self-executing machine-language file, a command-options page appears. Pressing any key exits this page and your source directory appears on screen. Pressing the Reset button returns you to the options page.

These utilities are fast and easy to use. They are convenient for those wanting to re-organize their disk libraries. The price makes this package a real bargain.

(Carl England, 128 Sheperd Dr. N.E., Calhoun, GA 30701, 404-629-7197; $15)

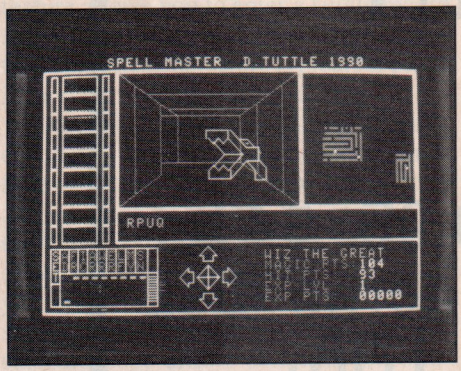
— Tony Olive

Game CoCo 3

Spell Master

Spell Master will be a great disappointment to those of you looking for a good program to check and correct spelling errors. But, if you are bored since cracking the Chinese Military Code during the Beijing freedom uprising or spend your free time deciphering bar codes in supermarkets, then *Spell Master* is for you.

For $18 you get a non copy-protected disk and half a page of booting hints. A Coco 3 with at least 128K, a disk drive, a joystick as well as an infinite amount of wit and patience are not included in the package, but are required for the adventurer to gain admittance to the Plane of Non-Existence in this graphics adventure.



Unlike most adventures, you can't buy, borrow or steal weapons to defend yourself from monsters waiting in the dungeons. Your only chance for survival is to cast magic spells that may or may not protect you from these monsters. To make things more challenging for those blessed with inordinate memory, keep in mind that while all invisible monsters look alike, their characteristics are different. Therefore, the successful defeat of one monster with a spell, does not neccessarily mean the defeat of all monsters with that same spell. But don't despair, there are supposedly 100,000,000 attack spells and an equal number of defense spells to help in your quest. This reviewer did not check to see if the count was accurate.

> The object of the game is to battle against nasty, disgusting, obnoxious and not very nice monsters and navigate through 10 levels to become a Spell Master.

The object of the game is to battle against an infinite number of nasty, disgusting, obnoxious and not very nice monsters and navigate through 10 levels to become a Spell Master.

Before the game begins, the program generates a game file that is different each time. You will be prompted to enter a complexity factor between one and nine. The higher the complexity factor, the more complicated the maze and the more vicious the numerous monsters will be.

You can choose the characteristics of your adventurer. Since you will undoubtedly die many deaths before even finishing the first level, you can create nine different characters and mazes to store in a file. Once this is done, the game screen appears. The screen consists of a 3-D view from your character's perspective as well as an overhead view of the maze. The walls of the maze appear only as your character travels along them, so finding the exit is not an easy task.

The only thing left is to create your spells. All movement, including the creation and casting of spells, is accomplished by joystick. Just move the cursor to the desired icon and press the fire button. There are nine spells at your command. These can be changed as often as necessary. Each spell has eight categories and an attack/defense switch. Mix various doses of Fire, Ice, Air, Water, Earth, Life, Movement and Senses to customize the aforementioned 100,000,000 spells. The successful adventurer is he who can keep track of which spell is effective against which creatures. It is advisable to have paper and pencil at hand.

The game is very complex and comes with an instruction file that can be loaded and printed with any word processor. Even with the instructions, the novice adventurer will find *Spell Master* trying and frustrating. It is especially frustrating to re-boot the game after the death of each character. The game would be more enjoyable if the first couple of levels were less complicated and the character had more lives. But for the avid, hard-nosed, die-hard adventurer, *Spell Master* is a nice addition to the software library.

(Daniel Tuttle, 325 Hillsown Road, Manchester, CT 06040, 203-643-1072; $18)

— George Aftamonow

Graphics CoCo 3

NFL Helmets Scrapbook

NFL Helmets Scrapbook is a display of all 28 helmets found in professional football. The program is conveniently broken into six picture files, each representing one division; the NFL East, West and Central, as well as the AFL East, West and Central are all represented. A CoCo 3, *CoCo Max III* and a joystick, or mouse, are needed to view the images. A printer is also required if you want a hardcopy of a sketch on the monitor.

For those who are unfamiliar with the *CoCo Max III* program, it allows sections of an existing picture to be cut, edited, moved and saved as a scrapbook page in order to be pasted into another graphics screen. *NFL Helmets Scrapbook* displays four or five helmets per screen from which any one, or all, can be cut out and and inserted in a graphics design of your own creation.

The *NFL Helmets Scrapbook* disk comes with a one-page manual that adequately describes the step-by-step procedures of how to load, cut, paste and move a picture. The manual also has another page that displays all 28 helmets. You can identify the different team helmets even though the finer details are lacking.

Although the documentation does not suggest any applications for this program, we were able to create some suggestions for our own use. One idea is to use a

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letterhead, or eye catching address label, that can be further enhanced by the many available fonts that come with the *CoCo Max III* software. Helmet images can also be printed, then physically cut out and glued to books, toys and lunchboxes. And since all drawings are in black and white, each page can also serve as a coloring book. This should keep youngsters occupied for hours. *NFL Helmets Scrapbook* is reasonably priced at $10.

(Kathy Rumpel, Route 1, Box 67 A, Arcadia, WI 54612; $10)

— George Aftamonow

Utility | CoCo 1, 2 & 3

StarPic

StarPic Picture Utility claims to be a total PMODE4, picture-printing program designed for use with the Star NX-1000 dot-matrix printers. These claims might be true, but the first impressions can be very different.

This utility comes on a single disk with a one-sheet manual. It contains an upgrade addendum for Version 2.3 that addresses *StarPic Picture Utility*, *DMP Picture Utility* and *GEM Picture Utility*. The upgrade addendum is on a separate sheet, which destroys the manual's continuity.

> *StarPic* has three pull-down menus (Disk, Baud and Goodies) across the top of the main screen displaying the available picture files.

StarPic works on any CoCo with 64K RAM and a disk drive. According to the manual, the program uses the right joystick for choosing pictures. The manual fails to clearly state that the joystick is mandatory. You cannot use the program without a joystick. I suggest using a free-floating joystick rather than a self-centering one.

The interface is similar to a Macintosh graphics user interface. Move the cursor with the right joystick to select from a list of pictures or activate pull-down menus to choose different options.

When loading, *StarPic* checks the disk for picture files with the extension of .MAX and lists them in the file window. Files without a .MAX extension are not recognized by *StarPic*. Save your home-brew PMODE4 pictures on disk from $E00 to $25FF with an extension of .MAX. Double-screen pictures need to be saved from $E00 to $3DFF.

No mention of how to save a file is made in the manual until the second page, fourth paragraph, under a note about the error message for an off-line printer. As a computer support specialist I have found that the easier the interface, the less a user must know about getting the program running. And the easier it is to work. It would be great if *StarPic* would allow you to save that screen to disk with a user-specified filename by tagging on it the needed .MAX extension. A section of the manual should be dedicated to explaining what a user needs to know about saving and loading PMODE4 files in BASIC.

The program does give an example of how to make a double-screen picture one screen long. To do this, load the picture from disk with LOADM *"filename*.MAX", then resave the file with SAVEM *"filename*.MAX",&H0E00,&H25FF,&HA027. Why not tell the user that he can use that same SAVEM command to save a PMODE4 screen in memory to disk? I wish program authors would remember the novice when writing their programs.

StarPic has three pull-down menus (Disk, Baud and Goodies) across the top of the main screen displaying the available picture files. At the bottom of the screen, a Help bar hints at the required action or presents messages such as Select File, Loading Filename or Select Menu Item. Place the cursor over the filename you want to load and press the fire button. The Help bar displays Loading Filename and the picture appears on screen. If you attempt to load a picture that was originally saved in the wrong format, you receive an error message.

The Disk menu allows you to select the default drive (0, 1, 2 or 3). You can place the program in Drive 0 with its demo files and a second disk of picture files in Drive 1. The New Disk choice allows you to read a new disk you have put into the active drive. Use the Drive=x choice to set the destination drive for disk saves. The menu indicates the active picture and destination drive by placing (=) next to the drive listings. There is also an About selection that displays the title screen. The menus show inactive choices in gray. The Disk menu grays two file choices, Compress and Save Pic, until a file is loaded.

Compress saves the loaded picture in a compressed format with a .CMX extension. This allows the file to take up less disk space. This mode works only with *StarPic*. One warning, *StarPic* will acknowledge only the first 36 pictures on a disk. Any files above that number will not appear in the menu. Save Pic saves the loaded picture in a non-compressed format. Quit exits the program.

The second pull-down menu is Baud. This menu allows you to change the baud to

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600, 1200, 2400, 4800 or 9600. Again, an equals sign (=) shows which choice is active.

Goodies is the last pull-down menu, and it allows you to play with the loaded picture. If you have loaded a double-screen picture, use the joystick to scroll around to view the entire screen. Show Page views the present file. You can exit the picture view by pressing the fire button and select Change Mode from the menu or press the space bar to toggle the picture between four graphics modes. For the CoCo 3, the author set up the palettes to simulate the older CoCos' four-color artifact mode in modes 3 and 4.

Com Picture, or pressing Enter in the view screen, complements the picture. This actually makes all the pixels on the screen change. In other words, this inverts the picture. Black changes to white and blue changes to red, etc. You can choose Swap Colors from the menu to swap red and blue, while leaving black and white the same. This choice seems to do the same thing as the Change Mode/space bar except the colors change in a painting movement. You can also activate this feature by pressing S.

Hor Flip and Vert Flip menu selections rotate the picture 180 degrees horizontally and vertically, respectively. You can flip the picture while viewing by pressing H or V. These functions work only on single-screen pictures — the choices will be gray on the menu when a double-screen picture is loaded. The Mirror Flip menu selection works on either single- or double-screen pictures. This function does a horizontal flip which is handy for T-shirt transfers. Pressing M while viewing also activates this function. The manual states Mirror Flip is for black & white pictures only. It functions on color pictures in the same way as the Hor Flip, but the colors are reversed as if you had pressed the space bar.

The next two menu selections control Walk Around, an automatic slide show. Choosing Walk Around cycles through each file on disk, flashing the picture on screen for the amount of time specified by Walk time=x. In this function X equals the number of seconds each file will be viewed during Walk Around; a value of 0 translates to about 1 second and a value of 9 is 22 seconds.

The last two menu items are the printing utility functions. Small Print produces a 3"-by-3" copy of the picture. Double-screen pictures are printed automatically without any paper alignment. Small print makes some nice, high-quality pictures very quickly. The Large Print selection first checks for double screen pictures. A double-screen picture is printed on a full sheet in portrait (upright) mode, while a single-screen picture fills a full sheet in landscape (sideways) mode. Both printing functions check and notify you if your printer is off-line. Once printing has started, the only way to abort is by turning off the CoCo.

StarPic can be used on all CoCos but does not take advantage of the CoCo 3's enhanced graphics capabilities.

The program uses the Star NX-1000 dot-matrix printer and allows you to see four colors on screen; blue, red, white and black. But it does not translate these colors for screen dumps. *StarPic* is a black and white screen dump program for PMODE4 screens.

The program lives up to its claims. Once the picture is on disk in the correct format, it is easy to load and print. You can flip the picture and print it reduced or on a full page. *StarPic* is of no use to a CoCo 3 owner working exclusively with Hi-Res graphics. If you own an NX-1000 and a CoCo, and don't need to work with the CoCo 3's enhanced graphics, *StarPic* should be all you will ever need.

(Second City Software, P.O. Box 72956, Roselle, IL 60172, 312-653-5610; $19.95)

— Kay Cornwell

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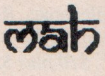

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La Belle Lucie, a solitaire card game sometimes know as "Three Shuffles and a Cheat." The entire pack of cards is used in the initial setup by setting all cards face up in overlapping trios. Cards are played onto the tableau in descending order within the same suit. The object of the game is to get all 52 cards onto the foundation. You have three deals in order to accomplish this. The game features full-color graphics. Requires a CoCo 3, a disk drive and a joystick or mouse. *Eversoft Games Ltd, P.O. Box 3354, Arlington, WA 98223, (206) 653-5263; $14.95 plus $2 S/H.*

Level II Tools, a set of 25 utilities that are useful in the day-to-day usage of OS-9 Level II. Commands are included for wild cards, directory structures, command files, pipe filters, utilities, color manipulation, and window handling. Requires OS-9 Level II. *Alpha Software Technologies, 210 Bluefield Drive, Slidell, LA 70458, (601) 688-3140; $24.95 plus $3 S/H.*

File Recovery System, restores "lost" OS-9 files and directories by rebuilding their directory entries or file descriptor sectors. Works on any type of OS-9 disk including RAM disks, floppy disk, and hard disks. Command line options allow *Recover* to display file recovery actions without actually modifying the disk. Requires OS-9 Level I or Level II with at least 24K of free memory and one drive. *Burke & Burke, P.O. Box 733, Maple Valley, WA 98038, (800) 237-2409; $24.95 plus min. $3 S/H US, min. $4 S/H Cdn.*

CoCo Archiver, a disk-file manager and archiver for Disk BASIC. Lists archive files with descriptive memos. Copies, kills, and renames files. Includes a help screen. Shareware feature provided for BBS use. *Danosoft, P.O. Box 124, Station A, Mississauga, L5A 2Z7 ONT, (416) 897-0121; $17.95 US; $20.80 Cdn., plus $2.50 S/H, Ontario Residents add 8% Tax.*

Graphics Utility, a tutorial on how to store multiple Hi-Res graphics screens in CoCo 3 memory for instant recall and how to save and load them from disk. Requires a CoCo 3. Numerous remarks in program listing to understand routines used. *Danosoft, P.O. Box 124, Station A, Mississauga, L5A 2Z7 ONT, (416) 897-0121; $8.95 US; $10.50 Cdn., plus $2.50 S/H, Ontario Residents add 8% Tax.*

Funstats, a general statistics program for a CoCo 1, 2 or 3 with at least 32K. Fifty different statistical programs are contained in this package. Just enter numbers and the computer calculates the statistics. You should have some knowledge of statistical formulas. *Trading Post, P.O. Box 3453, Carbondale, IL 62902-3453, (618) 457-5258; $39.95 plus $3 S/H.*

CoCo Calculator, converts your computer into a calculator. Use it for addition, subtraction, multiplication, division, square roots, powers, rates and percentages. Has seven memory banks for the storage of constants and intermediate results. Additional features include a counter and commands for the setting and rounding of decimal places. Requires 16K of memory. For the CoCo 1, 2 or 3. *Trading Post, P.O. Box 3453, Carbondale, IL 62902-3453, (618) 457-5258; $14.95 plus $3 S/H.*

CoCo Labels, creates a double-column, multipage screen index. Printout one, all or many copies of the same label. Print each line in a different font using a Tandy printer. Requires 32K. *Trading Post, P.O. Box 3453, Carbondale, IL 62902-3453, (618) 457-5258; $29.95 plus $3 S/H.*

Bankman, menu-driven program for continously updating your checkbook. Allows you to keep a running record of deposits, checks and accounts. Files can be saved edited and printed. Lets you reconcile and analyze particular accounts. Requires 32K CoCo 1, 2 or 3. *Trading Post, P.O. Box 3453, Carbondale, IL 62902-3453, (618) 457-5258; $39.95 plus $3 S/H.*

Brainbusters Test Writer, Design multiple-choice and true/false questions. Allows you to edit, save, load, select, display, randomize and print. Includes utilities for making a cover sheet, answer key and instructions. Requires 32K. *Trading Post, P.O. Box 3453, Carbondale, IL 62902-3453, (618) 457-5258; $39.95 plus $3 S/H.*

Brainbuster Examiner, permits Brainbuster quizzes to be taken onscreen rather than in written form. For classroom, home or office. Requires 32K. *Trading Post, P.O. Box 3453, Carbondale, IL 62902-3453, (618) 457-5258; $24.95 plus $3 S/H.*

Trivia Quizzes, preconstructed data files for use with the Brainbuster Test Writer or Examiner programs. Four separate quizzes are available. *Trading Post, P.O. Box 3453, Carbondale, IL 62902-3453, (618) 457-5258; 25 questions $5.50, 50 questions $10.95 plus $3 S/H.*

Diskette File Protector, this copy-protection scheme changes the filename extension to protect files from being run or killed. Protected filenames must be unprotected prior to being run or executed. Programs allows for tagging of multiple filenames. Requires a CoCo 3 and one disk drive. *Datatech Micro Systems, 4612 Arden, Lansing, MI 48917; $10 plus $2.50 S/H.*

Mixed Blessings, a collection of 23 programs. Includes a random-maze generator, an address-storage/retrieval system, several games, utilities, and a two-player chess simulation. All programs compatible with the CoCo 2, most will run on a tape-based system. *John Friedrich, Grove City College, Box 1877, Grove City, PA 16127, (412) 458-3088 or (412) 224-4194; $17.95, specify tape or disk.*

BED, binary editor for disk. Helps fix disk problems. It reads any sector and displays, edits, and writes it to disk. It also searches disks for bad sectors. *Soft & Friendly, 129 Prairie, Virdon, IL 62690, (217) 965-4199; $13.95 plus $2.95 S/H.*

CC3FAX, this program allows you to receive FAX transmissions. Requires a 512K CoCo 3, 40-track DSDD Drive 0 and a shortwave receiver capable of SSB (single-sideband) or CW (morse code) reception. It is now possible to see the entire 368K picture on a 256-by-225 screen as a 1/64 size image; resolution 1/8 horizontal by 1/8 vertical. Additional print drivers are being added to the program. *Robert Gault, 832 N. Renaud, Grosse Pointe Woods, MI 48236; $29 plus min $4 S/H.*

Smartwatch Drivers, these drivers are for the CoCo 3 only. They make the functions of the SmartWatch (sold by Tandy and other sources in the RAINBOW) available to the standard Tandy Disk BASIC 1.0 and 1.1 systems. The 12- or 24-hour format can be selected. Also included is a driver for *Ultimaterm* modem-communications program. *Robert Gault, 832 N. Renaud, Grosse Pointe Woods, MI 48236; $12 plus min $4 S/H.*

CEBBS Online Programs, a collection of programs to provide operators of CEBBS with a variety of games and support files to enhance their BBS. Programs include craps, blackjack, hangman, a voting booth, drive configuration for support files, an editor for maintenance functions, an auto-alphabetizing BBS lister, a place for messages, and a personal-profile database program. *KB Enterprises, 435 Brightwaters Drive, Cocoa Beach, FL 32931, (407) 799-3253; $15.95 plus $3 S/H.*

First product received from this company

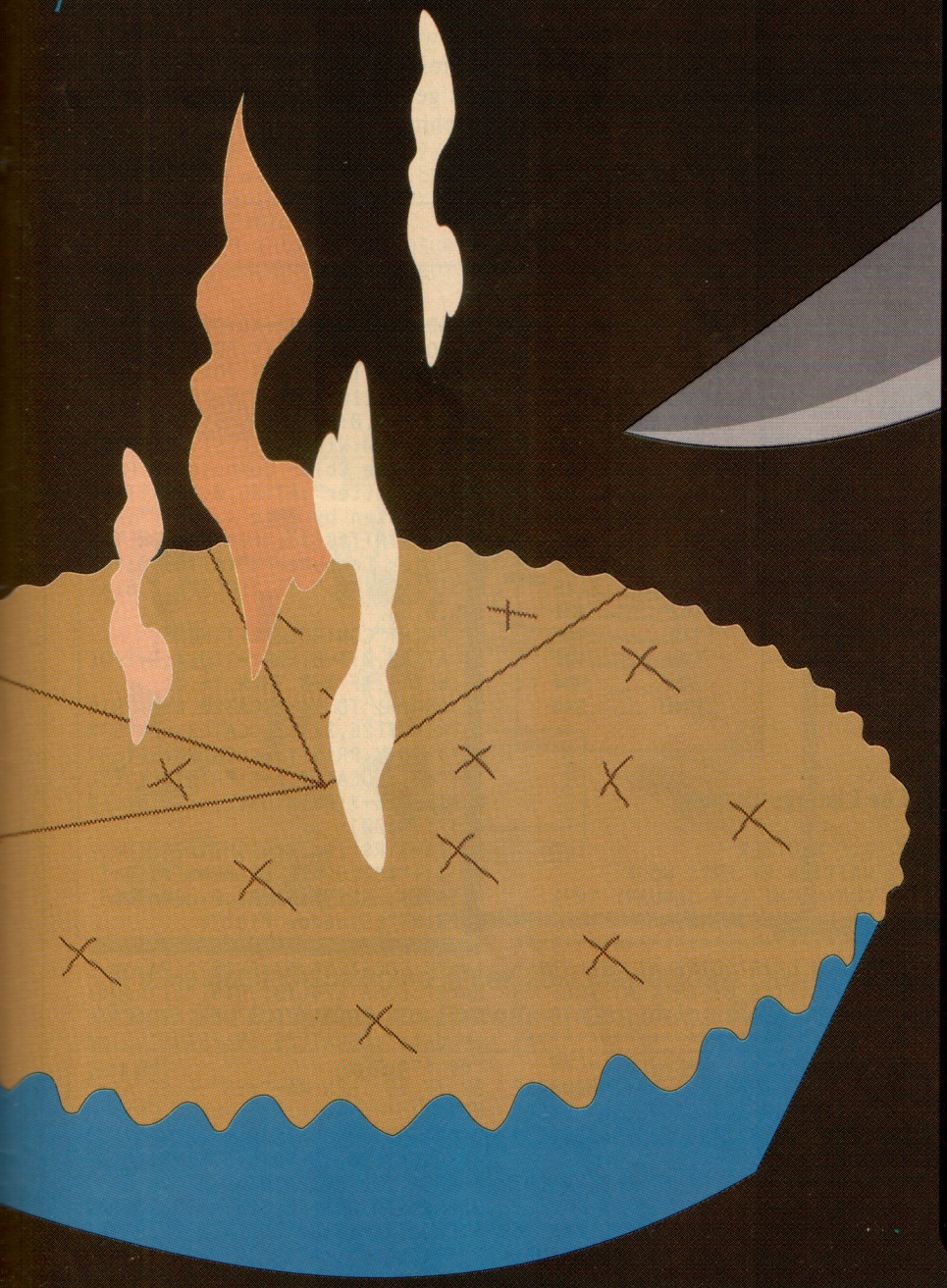
The *Seal of Certification* is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the program does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

Pie Plotter

In search of a better slice . . .

by Eric A. Wolf



Pie Plotter allows Color Computer 3 users to draw multicolor pie graphs from raw data. The program runs with either an RGB or composite monitor and requires a disk drive for loading and saving graphs. The program uses the high-speed mode and the 320-by-192, 16-color high-resolution screen for graphics. You can enter up to 14 separate data samples and the program graphs them in their own colors (with labels and percentages) for visually pleasing graphics results. *Pie Plotter* makes the task of designing pie graphs easier for the beginner as well as the advanced user.

Operating Instructions

Enter the program from Listing 1 and save it to disk. Then enter RUN to start the program. The Settings control menu appears on the screen with blank graph data listed. This is where you conduct most of your work. The yellow text is the data and the green line at the bottom is your current title for the graph data. The gray text at the right of the screen has commands that alter or display this data. These selections are explained below.

Shadow Graph — Pressing S toggles this choice between Yes and No. If you choose Yes, the graph will have a gray shadow behind it. If you choose No, there will be no shadow.

Modify Entry — Pressing M allows you to change data in one of the 14 data slots in the yellow data column. Enter the number of the slot you want to modify (1-14) or enter 99 to exit this process. After entering the appropriate slot number, enter the modified data. Numbers 0-9999 are accepted. Next, enter the label that goes with this data. The new data is placed in the data column accordingly.

Eric Wolf is a sophomore at LaSalle High School. He has been writing computer software for several years now and is the author of The Newspaper desktop publishing system. He can be contacted at 1630 N. Johnson Street, South Bend, IN 46628.

Plot Chart — Press P to plot the entered data as a circular pie chart. The screen clears and the graph is drawn along with percentages, labels and the graph title. After the graph is drawn, press any key to return. *Pie Plotter* plots the graph according to the relation of a specific number to other numbers in the total data table. The sin and cos mathematical functions are used for line placement.

Input/Output — Pressing I takes you to the Input/Output control menu. From here you can save, load, clear and display your graphs, as well as perform the functions listed below. To activate a function, just press the number associated with it on the I/O control menu.

Clear — clears the graph currently in memory.

Load — allows you to load a previously saved graph from disk. Enter the filename or DIR for a disk directory. The graph is displayed. Press a key to continue.

Save — enables you to save a graph in memory to disk. Enter the filename you want the data saved with, or enter DIR for a disk directory. After the graph is saved, you are returned to the I/O menu.

Display — draws the currently defined chart. See Plot Chart for more information.

Demographics To Screen — prints the demographics of the data to the screen. This includes chart titles, percentages, labels and units for the data in memory. This function also displays the amount of data accounted for in the graph. Press any key to continue.

Demographics To Printer — identical to the Demographics To Screen option except the results are sent to the printer.

Exit — return to the Control Editor.

Clear Graph Data — Pressing C clears the current data. You are asked if this data is actually to be cleared. Enter Y to clear the data or N to abort the clearing process.

Degree of Rotation — This number signifies the degree at which the first line of the graph is to be drawn. Pressing D increases this number by two degrees. The degree of rotation is usually 0, but other values will tilt your graph for added effects.

Title — Pressing T allows you to enter a new title for your graph. Type the new title and press enter. A title can be only about 30 characters long. The title appears at the top of the screen when the chart is displayed.

Monitor Selection

Due to video hardware differences of CoCo 3s, you must tell the program what type of monitor you are using. To do this, modify Variable MN as indicated in Line 10. If you are using an RGB monitor, leave the value at 0 (zero). If you are using a composite monitor, set the value to 1.

Sample Session

To begin, imagine you are a writing a report on how people spend their weekends. You have surveyed several groups of various ages and have received 487 responses. Now you need a way to effectively communicate this information to readers. Use *Pie Plotter* to perform this task. You can easily plot a pie graph to better show this information.

Through the study you have determined that 120 people spend their weekends shopping. So, press M to modify a slot in your graph. Next, enter 1 to select the first blank in the graph. Enter 120 to indicate the data value for this slot. And enter SHOPPING, the label that goes with this slot.

In the survey you found 54 people like to travel on the weekend. Again, press M and enter 2 to alter the second data slot. Enter 54 to signify the number of people and then enter TRAVEL for the label.

You also found 87 people who go to the beach on the weekend. Press M and enter 3. Enter 87 for the number of people and AT BEACH for the label.

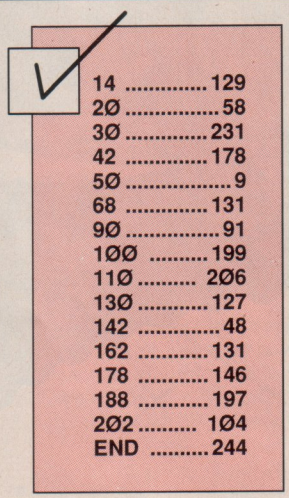
A majority of your survey, 98 people like to stay home all weekend and watch TV or work around the house. Press M and enter 4 for the fourth slot. Enter 98 for this group and label them STAYS HOME.

There is a group of people who work on the weekend. Press M and enter 5. Now enter the number 90 and label this group WORK.

To round out your survey, there are 38 people who don't fit into any specific category and need to be placed in a miscellaneous category. Press M and enter 6 for Slot 6. Now enter the number 38 and the label MISC.

To title your graph, press T and enter WHAT PEOPLE DO ON A WEEKEND. Your graph is now complete. To view the graph, press P. Press any key to return. This should help you get started. Have fun and happy pie graphing. ❑

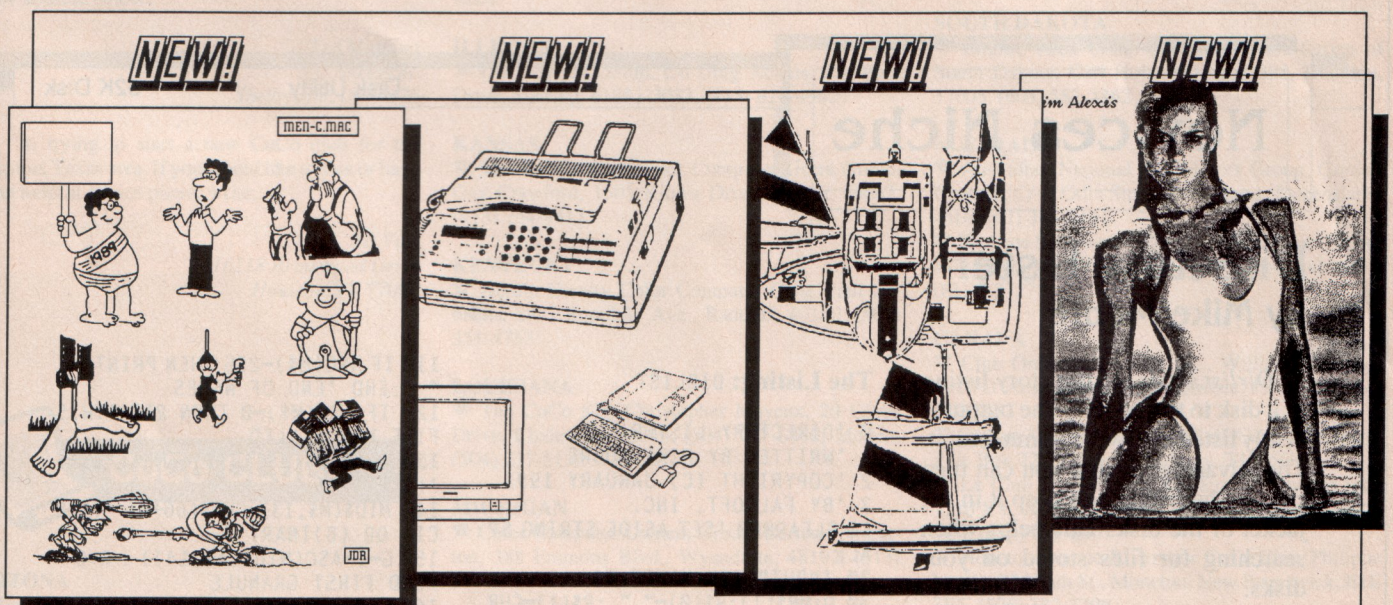
CoCo 3 Disk



The Listing: PIECHART

```
Ø 'PIE PLOTTER
   WRITTEN BY ERIC WOLF
   COPYRIGHT (C) JANUARY 1991
   BY FALSOFT, INC.
1 '*****************************
2 '* PIE CHART DISPLAY UTILITY *
4 '*  WRITTEN BY ERIC A. WOLF  *
6 '*  FOR A 128K TANDY COCO 3  *
8 '*****************************
1Ø MN=Ø '<==--  Ø=RGB & 1=CMP
12 IF MN=Ø THEN RGB:MN$="ØØØ8Ø92
532363453540216220756635Ø" ELSE
CMP:MN$="ØØ131145Ø72321543602173
416326332"
14 FORY=Ø TO 15:PALETTE Y,VAL(MI
D$(MN$,Y*2+1,2)):NEXTY
16 POKE65497,Ø:ATTRØ,4:PCLEAR1:C
LEAR32ØØ:DIM D(15),D$(15):GOSUB6
8
18 AD=&HFØ9D:FORY=AD+256 TO AD+2
62:POKE Y,255:NEXTY:POKE Y,Ø:FOR
 Y=AD+216 TO AD+223:POKE Y,255:N
EXT:Y=AD+216:POKE Y,Ø:POKE Y+2,Ø
:POKE Y+7,Ø:POKE Y+5,Ø:AD=Ø
2Ø ATTRØ,Ø:WIDTH4Ø:CLS1:ATTR6,Ø:
PRINT" The Color Computer 3 Pie
Chart Plotter":ATTR5,Ø:PRINTTAB(
9);"Written by Eric A. Wolf":ATT
R4,Ø:PRINTTAB(3);"For a 128k TAN
DY Color Computer 3":ATTR5,Ø:PRI
NTSTRING$(4Ø,"-");:LOCATE12,5:AT
TR5,Ø,U
22 PRINT"CONTROL SETTINGS";
24 ATTRØ,Ø:T=Ø:FORY=1TO14:T=T+D(
Y):NEXTY:IF T=Ø THEN T=.Ø1
26 FORY=1 TO 14:LOCATEØ,6+Y:PRIN
TSTRING$(26,32);:LOCATE3-LEN(STR
$(Y)),6+Y:PRINTY;:LOCATE3,6+Y:PR
INT")";:LOCATE4,6+Y:PRINTD(Y);:L
OCATE1Ø,6+Y:PRINTD$(Y);:Z=INT((D
(Y)/T)*1ØØ)
28 Z$=STR$(Z):Z$=RIGHT$(Z$,LEN(Z
$)-1)+"%":LOCATE 25-LEN(Z$),6+Y:
PRINTZ$;:NEXTY:ATTR5,Ø:LOCATE26,
8:PRINT"(S)hadow Pie?";
3Ø LOCATE26,11:PRINT"(M)odify En
try";:LOCATE26,13:PRINT"(P)lot C
hart":LOCATE26,15:PRINT"(I)nput/
Output";:LOCATE26,17:PRINT"(C)le
ar data":LOCATE26,19:PRINT"(D)eg
ree start";
32 IF SH THEN A$="YES" ELSE A$="
NO"
34 ATTR6,Ø:LOCATE3Ø,9:PRINT"- ";
A$:LOCATE3Ø,18:PRINTSTRING$(8,32
):LOCATE32,2Ø:PRINTAD:ATTR5,Ø
36 B$=STRING$(4Ø,32):ATTR6,Ø:LOC
ATEØ,21:PRINTB$:LOCATEØ,22:PRINT
"(T)ITLE> ";:ATTR2,Ø:PRINTT$:ATT
```

```
R5,0
38 LOCATE38,23:FL=0
40 A$=INKEY$:IFA$="S" THEN FL=1:
IF SH=1 THEN SH=0:GOTO32 ELSE SH
=1:GOTO32
42 IFA$="T" THEN LOCATE9,22:ATTR
6,0:PRINT STRING$(60,32);:LOCATE
9,22:LINEINPUT T$:T=LEN(T$):T$=L
EFT$(T$,28):IF T>28 THEN 20 ELSE
 36
44 IF A$<>"M" THEN 50 ELSE LOCAT
E0,22:PRINTSTRING$(40,32);:LOCAT
E0,22:LINEINPUT"Modify what unit
 (1-14/99 = exit) >";M$:M=VAL(M$
):IF M=0 OR M>14 THEN LOCATE0,22
:PRINTSTRING$(64,32);:LOCATE0,23
:GOTO50
46 ATTR6,0:LOCATE0,22:PRINTSTRIN
G$(40,32);:LOCATE0,22:INPUT"Ente
r new unit VALUE ";D(M):IF D(M)>
9999 THEN 46
48 LOCATE0,22:PRINTSTRING$(40,32
);:LOCATE0,22:INPUT"Enter new un
it LABEL ";D$(M):IF LEN(D$(M))>1
1 THEN 48 ELSE 24
50 IF A$="D" THEN AD=AD+2:FL=2:I
F AD>359 THEN AD=0
52 IF A$="I" THEN 108
54 IF A$="C" THEN LOCATE0,22:PRI
NTSTRING$(40,32);:LOCATE0,22:INP
UT"Sure you want to clear this (
Y/N) ";A$:IF LEFT$(A$,1)="Y" THE
N GOSUB68:GOTO20 ELSE 32
56 IF A$="P" THEN C2=CO:GOSUB 78
:EXEC44539:HSCREEN0:CO=C2:GOTO20
58 IF FL=1 THEN 20 ELSE IF FL=2
THEN 32 ELSE 40
60 GOTO 60
62 '
64 REM ** CLEAR DATA TABLES **
66 '
68 B$=STRING$(11,46):FORY=1TO14:
D$(Y)=B$:D(Y)=0:NEXT:D(15)=9999:
SH=1:SC=1:MC=14:CO=1:T$="NO TITL
E":AD=0:ST=1
70 RETURN
72 '
74 REM ** PLOT PIE CHART **
76 '
78 HSCREEN2:X1=77:Y1=100:RD=77:C
O=ST:R1=RD/2:R2=5:T=0:C=0:IF SH
THEN HCIRCLE(X1+R2-2,Y1+R2),RD,1
5:HPAINT(X1+4,Y1+4),15,15:C1=0
80 C=C+1:IF D(C)=9999 THEN 86 EL
SE T=T+D(C):GOTO80
82 IF D(C) THEN C1=C1+1
84 GOTO80
86 IF T=0 THEN T=.0001
88 TX=10-INT(C1/2)
90 C=C-1:AO=AD/3.6:FOR Y=1 TO C:
HCOLOR CO:HCIRCLE(X1,Y1),RD:IF F
IX((D(Y)/T)*100)=0 THEN 98 ELSE
AN=AO:A1=AO:GOSUB100:HLINE(X1,Y1
)-(X2,Y2),PSET
92 AN=100*(D(Y)/T)+AO:AO=AN:A2=A
N::GOSUB100:HLINE(X1,Y1)-(X2,Y2)
,PSET:AN=A1+(A2-A1)/2:RD=RD-R1:G
OSUB100:HPAINT(X2,Y2):RD=RD+R1
94 A$=STR$(FIX(D(Y)/T*100)):A$=R
IGHT$(A$,LEN(A$)-1):A$=STRING$(3
-LEN(A$)," ")+A$:A$=A$+"% @@ "+D
$(Y):HPRINT(19,TX),A$:TX=TX+1
96 CO=CO+1:IF CO=MC+1 THEN CO=ST
98 NEXTY:HCIRCLE(X1,Y1),RD,0:HCO
LOR15:A$=STRING$((40-LEN(T$))/2-
1,59)+" "+T$+" "+STRING$((40-LEN
(T$))/2-1,59):HPRINT(0,0),A$:RET
URN
100 A=AN/57.141*3.6:X2=X1+SIN(A)
*RD:Y2=Y1-COS(A)*RD:RETURN
102 '
104 REM ** INPUT/OUTPUT
106 '
108 HSCREEN0:CLS:ATTR6,0:PRINTTA
B(3);"PIE CHART INPUT/OUTPUT CON
TROL MENU":ATTR5,0,U:PRINTSTRING
$(40,32);:ATTR6,0:PRINT:PRINTTAB
(9)"Please select a choice":ATTR
5,0:PRINT:PRINTTAB(42)"1. Clear
the data in memory":PRINT
110 PRINTTAB(2)"2. Load in a cha
rt from disk":PRINT:PRINTTAB(2)"
3. Save a chart to disk":PRINT:P
RINTTAB(2)"4. Display the chart
in memory":PRINT:PRINTTAB(2)"5.
Print chart demographic (Screen)
":PRINT
112 PRINTTAB(2)"6. Print chart d
emographic (Printer)":PRINT:PRIN
TTAB(2)"7. Exit back to the Sett
ings Control"
114 ATTR6,0:LOCATE10,21:INPUT"Yo
ur Choice > ";CH:IF CH<1 OR CH>7
 THEN 114
116 IF CH=1 THEN GOSUB68:GOTO20
```

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```
118 IF CH=4 THEN C2=CO:GOSUB78:E
XEC44539:CO=C2:GOTO108
120 IF CH=5 THEN D=0:GOTO138
122 IF CH=6 THEN D=-2:GOTO138
124 IF CH=7 THEN 20
126 IF CH=3 THEN 178
128 IF CH=2 THEN 196
130 STOP
132 '
134 REM ** PRINT DEMOGRAPHIC
136 '
138 CLS:IF D=-2 THEN LOCATE0,12:
PRINT"Ready printer and press an
y key to begin";:EXEC44539:POKE6
5496,0
140 V=0:CLS:PRINT#D," TITLE: ";T
$:PRINT#D:PRINT#D," PERCENT   LA
BEL"+STRING$(11,32)+"UNITS":PRIN
T#D," ";STRING$(35,"-"):FORY=1TO
14:IF D(Y)=0 THEN 148 ELSE PRINT
#D," ";:PRINT#D,USING("##.##");(
D(Y)/T*100);:V=V+INT(D(Y)/T*1000
0)/100:P$=" % - "
142 P$=P$+D$(Y)+STRING$(16-LEN(D
$(Y)),32)+"("
144 P1$=STR$(D(Y)):P1$=RIGHT$(P1
$,LEN(P1$)-1):P$=P$+P1$+")"
146 PRINT#D,P$
148 NEXTY
150 PRINT#D," ";STRING$(35,"-"):
PRINT#D,USING("###.##");V;:PRINT
#D," % accounted for in graph":P
RINT#D:PRINT#D
152 IF D=0 THEN EXEC44539
154 POKE65497,0:GOTO 108
156 '
158 REM ** INPUT A FILENAME
160 '
162 ATTR5,0:LOCATE0,3:PRINT"Ente
r the filename of the graph in w
hichyou want to load or type DIR
 and enter  to view the disk dir
ectory of a drive orenter EXIT t
o exit back to the menu":ATTR6,0
164 LOCATE0,8:LINEINPUT"Filename
 (or DIR)=-> ";F$:IF F$<>"DIR" T
HEN RETURN
166 ATTR5,0:LOCATE0,9:LINEINPUT"
Directory of what drive (0-3) >"
;D$:DR=VAL(D$)
168 IF DR<0 OR DR>3 THEN 166 ELS
E PRINT::ATTR6,0:POKE65496,0:DIR
 DR:PRINT:PRINT"Free Gans= ";FRE
E(DR):EXEC44539:POKE65497,0
170 RETURN
172 '
174 REM ** SAVE A FILE
176 '
178 ATTR6,0:CLS:LOCATE3,1:PRINT"
- Save in a pie graph to disk -"
:GOSUB162
180 IF F$="EXIT" THEN 108
182 IF F$="DIR" THEN 178 ELSE AT
TR6,0:CLS:A$="Save the file "+F$
:LOCATE20-LEN(A$)/2,5:PRINTA$:LO
CATE0,10:ATTR5,0:PRINT"Press SPA
CEBAR to save the file or pressa
ny other key to exit back to the
 Input/Output Menu.."
184 A$=INKEY$:IFA$=" " THEN 186
ELSE IFA$<>"" THEN 108 ELSE 184
186 ATTR6,0:LOCATE10,15:PRINT"Sa
ving Graph Now....":POKE65496,0:
OPEN"O",#1,F$
188 PRINT#1,SC:PRINT#1,ST:PRINT#
1,MC:PRINT#1,SH:PRINT#1,DG:PRINT
#1,AD:PRINT#1,T$:FORY=1TO15:PRIN
T#1,D(Y):PRINT#1,D$(Y):NEXTY:CLO
SE#1:POKE65497,0:GOTO108
190 '
192 REM ** LOAD A FILE
194 '
196 ATTR6,0:CLS:LOCATE4,1:PRINT"
- Load a pie graph from disk -":
GOSUB162
198 IF F$="EXIT" THEN 108
200 IF F$="DIR" THEN 196 ELSE AT
TR6,0:CLS:A$="Load the file "+F$
:LOCATE20-LEN(A$)/2,5:PRINTA$:LO
CATE0,10:ATTR5,0:PRINT"Press SPA
CEBAR to load the file or pressa
ny other key to exit back to the
 Input/Output Menu.."
202 A$=INKEY$:IFA$=" " THEN 204
ELSE IFA$<>"" THEN 108 ELSE 202
204 ATTR6,0:LOCATE10,15:PRINT"Lo
ading Graph Now...":POKE65496,0:
OPEN"I",#1,F$
206 INPUT#1,SC:INPUT#1,ST:INPUT#
1,MC:INPUT#1,SH:INPUT#1,DG:INPUT
#1,AD:INPUT#1,T$:FORY=1TO15:INPU
T#1,D(Y):INPUT#1,D$(Y):NEXTY:CLO
SE#1:POKE65497,0
208 C2=CO:GOSUB78:EXEC44539:HSCR
EEN0:C2=C0:GOTO108
```

Novices Niche

Disk Utility 32K Disk

Directory Lister

by Mike Moore

Dirlist sends the directory listing of a disk to the printer. The output is neatly listed in a two-column format. The advantage is that you can then cut out the listing and keep it in the jacket of the disk. This helps when searching for files stored on your disks.

When the program is run, you are asked for the disk name. This information is printed at the top of the listing to identify the disk being used. The number of free granules remaining on the disk is given next, followed by a listing of all the files on the disk in a format similar to DIR.

The only preparations for this utility are to make sure there is a disk in Drive 0 and the printer is online.

The Listing: DIRLIST

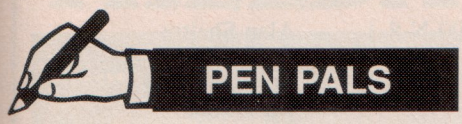
```
0 'DIRECTORY LISTER
1 'WRITTEN BY MIKE MOORE
2 'COPYRIGHT (C) JANUARY 1991
3 'BY FALSOFT, INC.
10 CLEAR800 'SET ASIDE STRING SP
ACE
20 INPUT"DISK NAME";N$
30 DIMR$(1):R$(0)=" " :R$(1)=CHR
$(13) ' CARRIAGE RETURN
40 N=-2 ' DEVICE IS THE PRINTER
50 PRINT#N,N$+"   FREE";FREE(0)
'PRINT THE TITLE
60 PRINT#N," " 'BLANK LINE
70 DSKI$0,17,2,C$,A$:C$=LEFT$(C$
,68) 'GET GRANULE POSITIONS
80 FOR S=3 TO 11:DSKI$0,17,S,A$,
B$ 'READ DIRECTORY
90 A$=A$+LEFT$(B$,127) : L=255 '
COLLECT NAMES TOGETHER
100 M$=LEFT$(A$,11)+"     " 'FIL
E NAME
110 IF ASC(M$)=255 THEN PRINT#N,
" ":END 'END OF NAMES
120 IF ASC(M$)=0 THEN 210 'THIS
FILE WAS KILLED
130 A=(MID$(A$,13,1)=CHR$(255))
'FILE TYPE
140 MID$(M$,13)=CHR$(66+A) '(A)S
CII OR (B)INARY
150 G=1+ASC(MID$(A$,14)) : R=0 '
FIND FIRST GRANULE
160 R=R+1:G=1+ASC(MID$(C$,G)) '
COUNT NEXT GRANULE
170 IF G<69 GOTO 160 'MORE GRANU
LES TO GET
180 B$=STR$(R) : MID$(M$,14,LEN(
B$))=B$ 'PUT IN # OF GRANULES
190 M$=LEFT$(M$,8)+" "+RIGHT$(M$
,8) 'SEPERATE NAME & EXTENSION
200 PRINT#N,M$+R$(P); : P=1-P 'P
RINT
210 L=L-32 : IF L>0 THEN A$=RIGH
T$(A$,L) : GOTO 100 'DROP A FILE
220 NEXT S 'GET NEXT SECTOR
```

Intercom

An important link in the CoCo community is its ability to communicate with fellow users. If questions arise, a fresh source of information can be invaluable. We here at THE RAINBOW have decided to create "Intercom," an information exchange point for Pen Pals, CoCo Clubs and BBSs.

If you would like a Pen Pal or are running a CoCo Club or BBS, send us a letter including the information listed here to: The Rainbow Intercom, P.O. Box 385, Prospect, KY 40059.

Only those parties who have signed our non-piracy "agreement form" appear in listings of Intercom. Also, please notify us if you want to add or delete any names on this list.



✍ I'm 16 years old. I bought a CoCo 3 last June and I've had a CoCo 2 since 1985. I live in Missoula, Montana and feel quite alone with my CoCo in this area. I've found no support anywhere nearby. I have not even met anyone who has a CoCo! I have lots of technical questions. Will someone continually write and expect letters from me. I need a Pen Pal who will help me. Also, I will help you, so please write.

Michael J. Miller
RR2 Moccasin Meadows
Missoula, MT 59802

✍ I'm interested in finding some local support for our CoCo. I haven't been able to locate a CoCo club in the Indianapolis area. If you have an existing club in the area or might like to start a new one please contact me at the address below.

Ted Mathues
502 Shelby St.
Shelbyville, IN 46176

✍ I'm trying to start a new CoCo club for the Houston, Texas area. If you would like to join or have some helpful advice please write.

Art Volz
16218 Brinkwood Drive
Houston, TX 77090

ARIZONA
☎ Tucson Color Computer Club, Bruce Smith, 3030 Mustang Drive, Tucson, 85708, (602) 747-7859

CALIFORNIA
☎ Citrus Color Computer Club, Orville Beaver, P.O. Box 6991, San Bernardino, 92412-6991, (714) 685-6334
☎ The Sacramento CoCo Club, William W. Drennon, 2444 Wurth CT., Sacramento, 95825, (916) 486-9665, BBS (916) 486-1594

COLORADO
☎ Colorado Springs Color Computer Club, Bud Ward, 1118 Claiborne Road, Colorado Springs, 80906-5513, (719) 392-8268

CONNECTICUT
☎ South Eastern Connecticut Color Computer Users Group, Larry Donovan, 25 Stony Brook Road, Stonington, 06378, (203) 535-4211

FLORIDA
☎ Cross-Country Color Computer Club, Tom Tittle, 860 Gardenia Drive, Royal Palm Beach, 33411, (407) 798-3726

GEORGIA
☎ Macon-Warner Robins Color Computer Users Group, Francis G. Swygert, 904 2nd Avenue, Robins AFB, 31098, (912) 328-7859

IDAHO
☎ Snake River Color Computer Club, Emil Franklin, 1750 Carmel Drive, Idaho Falls, 83403, (208) 522-0220

ILLINIOS
☎ CoCo Users Group, c/o Greg Adams, 224 Park Drive, Sterling, 61081-3033, (815) 626-4962

KANSAS
☎ The Kansas City Color Computer Users Group, Gay Crawford, 1601 Kiowa Drive, Olathe, 66062, (913) 764-9413

KENTUCKY
☎ Hardin County Color Computer Club, Paul Urbahns, 2887 Republic Ave., Radcliff, 40160, (502) 351-4757

LOUISIANA
☎ The CoCo Sig, Christopher Mayeux, 20 Gibbs Drive, Chalmette, 70043, (504) 277-6880, Modem (504) 277-5135

MICHIGAN
☎ Color Computer Owners Group, Bernard A. Patton, 388 Emmons Blvd., Wyandotte, 48192, (313) 283-2474

MISSISSIPPI
☎ Central Mississippi Color Computer Society, Boisy G. Pitre, 6011 I-55 North, Jackson, 39213, (601) 956-9377

MISSOURI
☎ CoCoNuts User Group, Clyde Lloyd, 2116 N. Columbia, Springfield, 65803, (417) 866-8738

NEW YORK
☎ Twin Tiers CoCo Club, William Cecchini, 319 Irvine Pl., Elmira, 14901, (607) 734-0065

NORTH CAROLINA
☎ Raleigh CoCo Club, P.O. Box 10632, Raleigh, 27605, (919) 878-3865
☎ The Tandy Color Computer Users of Charlotte, Eric Stringer, 1022 Noles Dr., Mt. Holly, 28120

OHIO
☎ The Columbus and Central Ohio Color Computer Club, Richard Heber, 546 Woodside Drive S.W., Pataskala, 43062, (614) 927-3357
☎ Dayton Area Color Computer Users Group, John Teague, 308 Orangewood Drive, Kettering, 45429, (513) 434-9168
☎ The Greater Toledo Color Computer Club, Bill Espen, 1319 North St., Bowling Green, 43402, (419) 471-9444

PENNSYLVANIA
☎ Johnstown Area Color Computer Users Group, Albert Baldish, 111 C St. Apt #1, Johnstown, 15906, (814)535-1497

SOUTH DAKOTA
☎ Empire Area Color Computer Users Group of South Dakota, Carl Holt, P.O. Box 395, Brandon, 57005, (605) 582-3862

AUSTRALIA
☎ Australian National OS-9 Users Group, Gordon Bentzen, C/- 8 Odin Street, Sunnybank, Queensland, 4109, (07) 345-5141
☎ Brisbane Southwest Colour Computer Users Group, Bob Devries, 21 Virgo St., Inala, Queensland, 4077, (61)-7-3727816

CANADA
☎ Club Ordinateur Metro Inc., William Manning, 3020 D'Angouleme, Tracy, Quebec, J3R 3B3, (514) 742-3692
☎ Calgary Colour Computer Club, Gerry McCleary, P.O. Box 22, Station M, Calgary, T1Y 5C4
☎ Le Club D'Ordinateur Couleur du Quebec Inc., 7110 8 e. Ave, St-Michel, Montreal, Quebec, H2A 3C4, (514) 729-8467
☎ Moncton-Dieppe-Riverview CoCo Club, Philippe Lantin, 77 Ninth St., Moncton, New Brunswick, E1E 3E5, (506) 382-7706

GERMANY
☎ OS-9 Users Group in Europe, Burghard Kinzel, Leipziger Ring 22A, D-5042 ERFTSTADT

PUERTO RICO
☎ Puerto Rico Color Computer Club, Luis R. Martinez, P.O. Box 2072, Guaynabo, 00657-7004, (809) 799-8217 or (809) 728-2314

BULLETIN BOARD SYSTEMS

State/City	BBS Name	Access Number	Parameters (Baud rate-Parity-Word Bits-Stop Bits)	SysOp
Arkansas				
Jonesboro	The 8-Bit Wonderland	(501)931-9528	300/1200/2400-N-8-1	Mike Smith
Sheridan	The Grant County BBS	(501)942-4047	300/1200/2400-N-8-1	Eddie Gilmore
California				
Hollywood	Zog's Cavern BBS	(213)461-7948	300/1200/2400-N-8-1	Alan Sheltra
Laguna Hills	Rainbow Connection Info Service	(714)831-6530	300/1200/2400-N-8-1	Eric Levinson
Marysville	09-Online BBS	(916)742-6809	300/1200-N-8-1	Jim Vestal
Colorado				
Colorado Springs	The Time Safari	(719)635-7228	300/1200-N-8-1	David Vallier
Florida				
Cocoa Beach	KB Enterprises' CEBBS[1]	(407)799-3282	300/1200-N-8-1	Kevin Berner
Hawaii				
Ft. Shafter	CoCo'Nuts BBS Service[2]	(808)845-7054	300/1200/2400-N-8-1	Tommie Taylor
Illinois				
Carpentersville	The Pinball Haven BBS	(708)428-8445	300/1200/2400-N-8-1	Jeffrey R. Chapin
La Grange Park	S & V BBS	(708)352-0948	300/1200/2400-N-8-1	Paul Jerkatis
Kansas				
Beloit	Kansas Konnektion BBS[3]	(913)738-5613	300/1200/2400-N-8-1	Gary N. McCarty
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Harvey	The Node 3	(504)347-4320	300/2400-N-8-1	Gene Clifton
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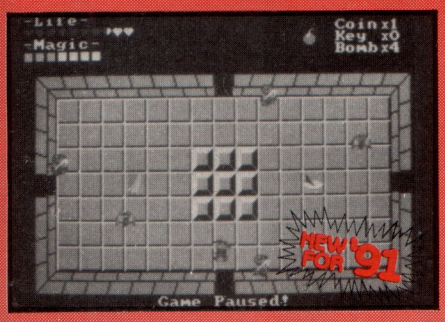
Worcester	Gosub BBS	(508)756-1442	300/1200/2400-N-8-1	Richard Bostock
Michigan				
Taylor	J & L's CoCo Corner	(313)292-4713	300/1200/2400-N-8-1	Jim Snider
New Hampshire				
Allenstown	The CoCoBean BBS	(603)485-8682	300/1200/2400-N-8-1	David Bean
New York				
Wappingers Falls	The Dutchess CoCo	(914)838-1261	300/1200/2400-N-8-1	Chris Serino
North Carolina				
Concord	The Stargate BBS	(704)788-7867	300/1200/2400-N-8-1	Jim Brock
Oklahoma				
Tecumseh	Pat BBS[4]	(405)598-5082	300-N-8-1	Pat Aldridge
Pennsylvania				
Conshohocken	Charlie's Help Line	(215)825-3226	300/1200-N-8-1 or N-7-1	Charles DiMartino
Johnstown	CoCo Electronic BBS[5]	(814)535-1497	300/1200/2400-N-8-1	Albert Baldish
Rhode Island				
Central Falls	The Weather Connection II BBS	(401) 728-8709	300/1200/2400-N-8-1	Eric Chew
Tennessee				
South Pittsburg	Base-Net BBS	(615)837-8352	300/1200/2400-N-8-1	Howard Bacon
Virginia				
Falls Mills	Clem's Corner BBS[6]	(703)322-4053	300/1200-N-8-1	Richard Douglas Bailey
Richmond	Tree House BBS	(804)744-9260	300/1200/2400-N-8-1	Doug James
Wisconsin				
Marinette	Phoenix Interstate Data Systems[7]	(715)732-1036	300/1200/2400/9600-N-8-1	Joe Boburka
Canada				
Lunenburg, N.S.	Color Nova BBS	(902)634-3095	300/1200/2400-N-8-1	John D. Cleveland

Notes:
[1]KB Enterprises' CEBBS is up 5 p.m. to 9 a.m. seven days a week (EST).
[2]CoCo'Nuts BBS Service is a relocation of CoCo'Nuts BBS of Fayetteville, North Carolia.
[3]Kansas Konnektion BBS is up from 10 p.m. to 7 a.m.
[4]Pat BBS is up 5 p.m. to 9 p.m. weekdays and 10 a.m. to 10 p.m. weekends. This new BBS is counting on you for uploads.
[5]CoCo Electronic BBS is up 8 p.m. to 6 a.m. seven days a week.
[6]Clem's Corner is up from 6 p.m. to 11 p.m. seven days a week.
[7]Phoenix Interstate Data Systems has a .75/hr charge for premium services, paid in advance.

NEW FOR '91

SUNDOG SYSTEMS

The Quest for THELDA



Better men than you have failed the quest, but the hand of the good princess Thelda is too much to resist! Stolen by the evil necromancer Divinax, she has been secreted far from prying eyes and it is now up to you to regain the pieces of the mystical Life Force and save the fair lady. The Quest for Thelda is an outstanding arcade program that combines action and adventure to bring you an incredible video game playing experience. Travel throughout over 500 different screens searching for magical objects and spells, fighting horrible creatures, and gathering the various parts of the Life Force guarded by ever-increasing terrors. You'll enjoy the highest quality 320x200 resolution 16 color graphics and digital sound effects that you've come to expect from Sundog Systems. The game play is fast and furious, and only you can rescue the princess and complete the **LEGEND OF THELDA!** Req. 128K CoCo 3, disk drive, and joystick (2-button joystick supported).

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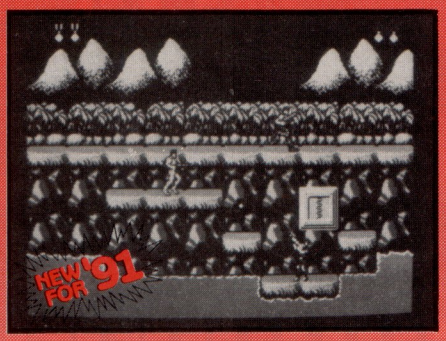
Hint book now available for Thelda! Contains clues, maps, and even a BASIC program to modify your own characters! **$4.95**

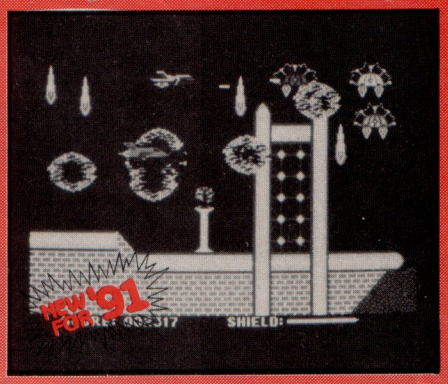
THE CONTRAS



In the year 2671, a mysterious object landed on Earth, heralding the alien invasion of the Red Falcon. Only two courageous soldiers have a hope of stemming this alien infestation. Armed with your military training and the latest weapon technology, you and a friend must fight back the horde. Sundog Systems presents our second 512K game, **The Contras**. You'll see why we decided to use 512K on this project! Amazing graphics with 320x225 resolution, 16 color full screen animation and horizontal smooth scrolling! Background digital sound effects and real-time music! One or two player action AT THE SAME TIME! You'll agree that this is one of the best arcade games yet for your 512K CoCo 3. Needless to say, playing hero won't be easy; playing The Contras will be tougher! Req. 512K CoCo 3, disk drive, and 2-button joystick.

$34.95

Crystal City



The superior technology of the evil Overlords has ensnared yet another innocent planet; however, this one contains the Crystal City, bastion of democracy and independence. Earth has had enough! Break through level upon level of their virtually invulnerable defenses, defeat the end guardians, and make your way ever closer to freeing the slaves of the Crystal City! This amazing arcade game is an achievement in its own right. Full 128K/512K utilization! Super fast horizontal hardware scrolling on the 128K computer! Wild digital sound effects and background music score! 30 minutes, or over 30 megabytes, of non-repeating 320x200 resolution, 16 color graphics! This game has it all; order a demo disk to see it first! Can you save the Crystal City from unbeatable foes? Req. 128K CoCo 3, disk drive, and joystick.

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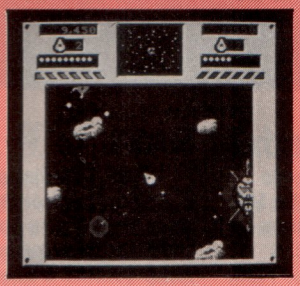
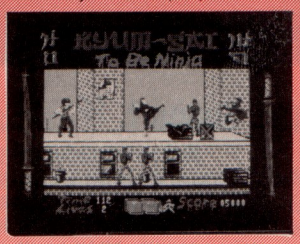
Sinistaar



You've raved about this 512K arcade game! The graphics and animation are amazing! You've got to hear the digital sounds! 512K (three disks) packed with excitement. 512K CoCo 3 only. $34.95

KYUM-SAI To Be NINJA



This martial arts arcade game remains a CoCo 3 phenomenon. One of our best sellers to date! Play the incredible combat experience that you've been missing, and call for the availability of the OS-9 version. 128K CoCo 3 action. $29.95.

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Zenix

You have been chosen to pilot the spacecraft wielding the plutonium plasma laser against the nefarious insectoids, the Zenians. These bugs have been ripping off the space trade lines for years; now they're about to find a victim who can fight back! Beat back the swarm of pests to their home planet Zenix, and use the laser to end the menace once and for all. Zenix is a lightning fast arcade game for the 128K CoCo 3. The 320x225 16 color graphics are amazing, as are the digital background music score and effects, all on a 128K computer! The fast action and game play will astound you in this GALAGA of extermination. Plug in your joystick and strap in for the ride of your life! Call to order a demo disk to see the action before you buy! Req. 128K CoCo 3, disk drive, and joystick.

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Our active developers program (the IMS Developers Association, or IDEA) has been secretly working for months on applications exclusive to the MM/1. These graphics editors, sound sampling programs, and animation utilities bring you unprecedented software power.

Give us a call to get a listing of all the vendors and developers supporting the MM/1. Ask us, too, about the colleges and universities around the United States already using the MM/1 in computer science and multimedia labs, pushing back computing frontiers with the same computer that is now available to you.

Smart.

If you're thinking of buying an IBM™ PC, Amiga, or Atari ST, think again. Much of your CoCo hardware is useless on these computers. All of your experience is also useless — unless you acquire an MM/1.

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Personal Computing recently reported that about one of every four MS-DOS users will abandon it in the next two years in favor of UNIX-style computing. Why? Because they want multitasking windows. The MM/1 has multitasking windows and goes beyond most UNIX computers with its graphics, sound, and ease of use.

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In other words, if you buy any other computer, you will probably get shortchanged.

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If you come to the Atlanta COCOFEST at the Atlanta Lakewood Holiday Inn, Oct. 6-7, Kenneth-Leigh Enterprises and Interactive Media Systems, Inc. will be there in full force, showing off the MM/1, its networking and graphics, its advanced windowing, and digital sound.

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Continued from Page 6

On Display

We recently received the photo (below) of "Over the Rainbow" by Larry Elliot. Larry discovered THE RAINBOW after completing his work of art, and he decided to share his work with us. While the black and white photo (courtesy of Campanile Galleries Inc., Chicago) does little justice to the rainbow depicted in the original 20"-by-24" oil work, we wanted to pass it along.

language have always been, and must always be, a part of THE RAINBOW. They represent new directions toward which the CoCo and I can grow. Am I a minority of one? I think not. I hope not.

By the way, as I re-read six years of THE RAINBOW searching for answers to my dumb questions about OS-9, I see that the overall balance between "gibberish" and "BASICs" has not changed significantly. Yes, THE RAINBOW has shrunk in stature and I hate that. But it's no more (or less) an OS-9 or machine-language magazine than it was when I first discovered it.

Mr. Price, instead of thumbing through THE RAINBOW in your bookstore looking for "good usable material," try taking it home and reading it. You might accidentally learn something.

John B. Eads
Sarasota, Florida

Keeping the Beats

Editor:

I am a Music Education major at University of Wisconsin-Green Bay and find my collection of music (all formats) more difficult to search through for a particular work or artist.

What type of program would make this search faster? For example, type in Bach and get a list of his works or type in Kyrie for a list of various works by that title. Also, where could I purchase such a program?

Jeffrey Hess
1305 Lawe Street Lower
Green Bay, WI 54301

You could purchase a generic database and create your own indexed reference. Also, see "Music Catalog" (November 1990, Page 56).

DTP in ROM?

Editor:

My son gave me a 64K CoCo, one drive, a DMP-106 and a CCR-81 recorder. After much correspondence with Tandy, we were able to secure the Color Scripsit II cartridge. We are wondering now if there is a cartridge similar to the Color Scripsit II that could be used with this keyboard to make large letters for banners and perform Home Publishing duties as well.

When my son had this unit, he received THE RAINBOW and we have copies going several years back. If you can be of any help to us, we would appreciate it.

By the way, what is a Color Computer 3 worth and are they available for purchase?

Lorin Giegerich
P.O. Box 135
Prairie du Sac, WI 53578

You can purchase a CoCo 3 from Radio Shack or Computer Plus. The price varies, so you'll have to check the ads. We know of no cartridges with desktop publishing capabilities. After you pick up a CoCo 3, though, check the ads in THE RAINBOW for disk-based software.

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

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Module Buster

by Jamie L. Cho

Bust is an OS-9 utility that breaks down files of merged modules. Just enter `bust("pathname","directory")`. If you don't specify the directory, *Bust* uses the current data directory. The modules are transferred one by one from the specified file to separate files.

Bust assumes that `rename`, `attr` and `runb` are available for its use. Load these before using *Bust*. Be careful which modules you breakdown. For example, you cannot bust the `shell` file that comes with OS-9 since it contains a program named `shell`. To avoid this problem, rename `shell` first. Also make sure you do not breakdown a file that contains modules already present in the directory being used. This results in an error.

Bust works by reading the specified file and putting it into separate files. The complex part of this utility is finding each merged program's name and where it ends. Page A-1 of the appendix in the OS-9 Level II manual includes the module format. The size of the module is a 16-bit number contained in bytes $02 and $03, following the sync bytes. The most significant digit is located at $02. The offset to the name string follows the module size. Once this 16-bit number is found, the name of the module is easily found. The end of the name is found when an ASCII character, whose value is greater than 128, is encountered. This value must be ANDed with 127.

The Listing: `Bust.b09`

```
PROCEDURE Bust
0000        (* Module Buster *)
0013        (* Written by Jamie L. Cho *)
0030        (* Copyright (c) January 1991 *)
0050        (* By Falsoft, Inc. *)
0066
0067        DIM ModSize,NameOffset,Count,InPath,OutPath:INT
EGER
007E        DIM ModuleName,Title:STRING
0089        DIM Char,ErrorNum,ByteVal,Number:BYTE
009C        DIM Test:BOOLEAN
00A3
00A4        PARAM Filename:STRING[60]
00B0        PARAM Directory:STRING[60]
00BC
00BD        ON ERROR GOTO 100
00C3
00C4        IF Filename="?" THEN
00D1          PRINT "Bust (";CHR$(34);"pathname";
CHR$(34);",";
00F3          PRINT CHR$(34);"directory";CHR$(34);")"
010C          PRINT "Function: Breaks down a merged  mod
ule."
0137          PRINT "Requires Runb, syscall, attr and
rename"
0162          END
0164        ENDIF
0166
0167        ModuleName=Directory+"/scratch"
017A 1      OPEN #InPath,Filename:READ
0189        Number=1
0190 10     Title=""
019A        Test=FALSE
01A0        Count=0
01A7        CREATE #OutPath,ModuleName
01B1 20     GET #InPath,Char
01BE        PUT #OutPath,Char
01C8
01C9        IF Count=2 THEN
01D5          ByteVal=Char
01DD        ENDIF
01DF
01E0        IF Count=3 THEN
01EC          ModSize=ByteVal*256+Char
01FC        ENDIF
01FE
01FF        IF Count=4 THEN
020B          NameOffset=Char
0213        ENDIF
0215
0216        IF Count=5 THEN
0222          NameOffset=NameOffset*256+Char
0232        ENDIF
0234
0235        IF Count>3 THEN
0241          IF Count+1=ModSize THEN
0251            CLOSE #OutPath
0257            Number=Number+1
0262            PRINT Title,
0268            SHELL "attr "+ModuleName+" e pe"
027D            SHELL "rename "+ModuleName+""+RIGHT$(Title,
LEN(Title)-1)
029C
029D            IF EOF(#InPath) THEN
02A7              CLOSE #InPath
02AD              END
02AF            ENDIF
02B1
02B2            GOTO 10
02B6          ENDIF
02B8        ENDIF
02BA
02BB        IF Count>=NameOffset AND Test=FALSE THEN
02CE          IF Char>127 THEN
02DA            Test=TRUE
02E0            Char=LAND(Char,127)
02EB          ENDIF
02ED
02EE          Title=Title+CHR$(Char)
02FB        ENDIF
02FD
02FE        Count=Count+1
0309        GOTO 20
030D        END
030F
0310 100    ErrorNum=ERR
0319
031A        IF ErrorNum=56 THEN
0326          ModuleName="scratch"
0334          GOTO 1
0338        ENDIF
033A
033B        PRINT "ERROR #";ErrorNum
034A        END
```

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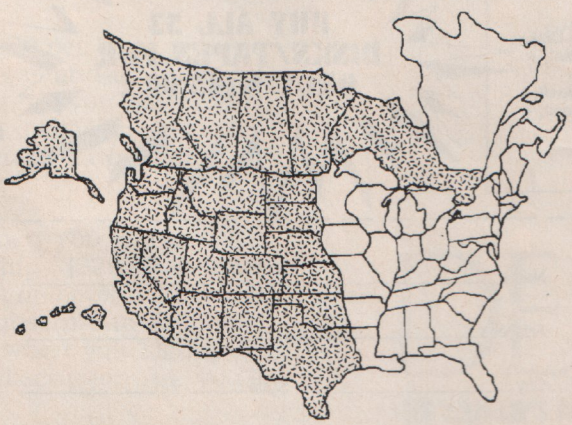

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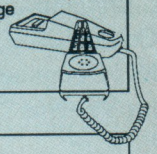


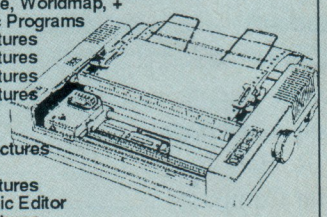
RAINBOW CERTIFICATION SEAL

EDUCATION 1-4

E1 - 12 Programs For Young Kids
E2 - 12 Programs For High School Kids
E3 - 11 Programs Teaching The Coco'S Commands
E4 - 5 Graphics Programs About Australia

GRAPHICS 1-14

GR1 - Atlanta, Cube, Space, +
GR2 - Objects, Wargame, Worldmap, +
GR3 - 9 Coco 3 Graphic Programs
GR4 - 22 Coco Max Pictures
GR5 - 22 Coco Max Pictures
GR6 - 22 Coco Max Pictures
GR7 - 15 Coco Max Pictures
GR8 - 22 .Bin Pictures
GR9 - 22 .Bin Pictures
GR10 - 14 Large .Bin Pictures
GR11 - 8 Mge Pictures
GR12 - Coco Max 3 Pictures
GR13 - Macpaint Graphic Editor
GR14 - 5 Macintosh Pictures

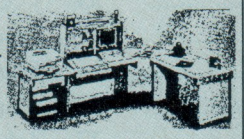


•• See Our Ad Containing 250 Graphic Pictures Elsewhere In This Magazine

HOME MANAGEMENT 1-4

• 12 Programs Each Disk/Tape •

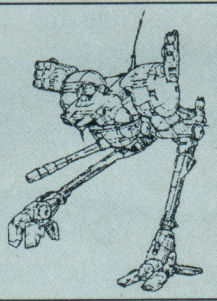
H1 - Checkbook, Loan, Word Processor, +
H2 - Cash Journal, Invest, Maillist, +
H3 - Life, Database, Stocks, +
H4 - Spelling Fix, Spelling Checker, +

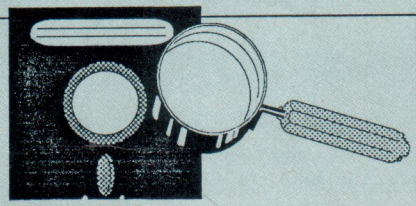


GAMES 1-11

• Each Disk/Tape Contains 12 Programs •

GA1 - 3D Tic Tac, Missile, Poker, Tycoon, +
GA2 - Amazing, Balloons, Motor Jump, Slots, +
GA3 - Battleship, Golf, Lander, Zero G, +
GA4 - ABM, LunarWorld, Protect, Subchase, +
GA5 - Blackjack, Lazer, Tipan, Utopia, +
GA6 - Kings, Maze, Shuffle, Tempest, +
GA7 - Chess, City, Life, StarTrek, +
GA8 - Chute, Germ, Hurkle, Lunar, +
GA9 - Civil War, Go-Fish, Stock, UFO Maze, +
GA10 - Cave, HiLow, Scramble, Word Hunt, +
GA11 - Biorythms, Craps 3, Gunner, Martians, +





UTILITIES 1-8

• 12 Programs Each, 1-4 Require Disk •

U1 - Backup 35, Basicmap, Timer, Tape-to-Disk, +
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M3	GR3	E3	U3	GA3
M4	GR4	E4	U4	GA4
M5	GR5		U5	GA5
M6	GR6	H1	U6	GA6
M7	GR7	H2	U7	GA7
	GR8	H3	U8	GA8
A1	GR9	H4		GA9
A2	GR10			GA10
	GR11			GA11
T1	GR12			
T2	GR13			
T3	GR14			

PLEASE CIRCLE
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Please turn to pages 5 & 59 for our Subscription Software!

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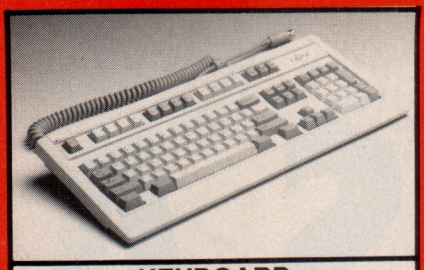

KEYBOARD

- 101 Keys with tactile touch
- Coiled cable with RF filter
- can be used with CoCo, Tandy or IBM and auto senses XT or AT

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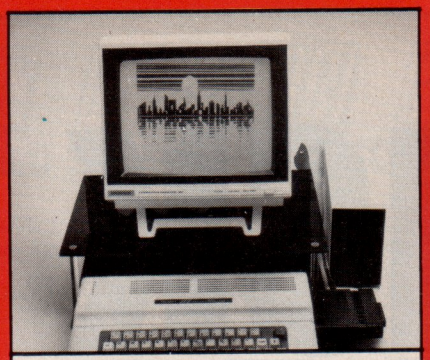
KB-A	CoCo Adaptor	$89.50
KB-1A	Keyboard & Adapt.	$149.00



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- Built in Speaker

$98 (7 ship)

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DC-3	Super Controller	$ 98.00
DC-6	No Halt Controller	$129.00
MBA-1	3 in 1 Board	$ 69.45
MEB	Mini Expansion Bus	$ 30.00
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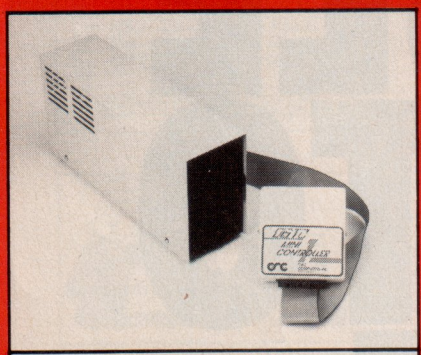
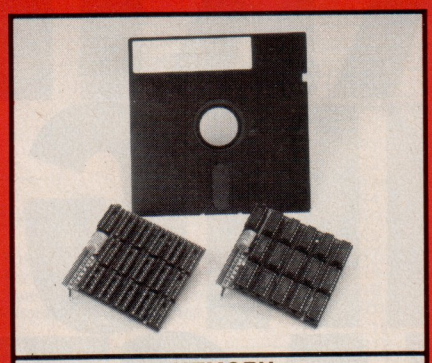
VA-1	Video Converter for CoCo 1&2	$29.45
HR-2	Dual Hi-res adapter	$39.45



DRIVE 0 PLUS

- Double sided 360K MPI 52
- Disto DC-7 controller and cable **$178.45**
- Double Drive 0+ **$289.00**
  Drive 0 + Drive 1 (TEAC)



MEMORY

• 512K Bare Board	**$40**
• Populated 512K & Software	**$89**
• 1 MEG Bare Board	**$160***
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*requires 512K upgrade

FLOPPY DRIVES

52	MPI 5¼ Full Height 40 track Double Sided 360K	$75.00
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SLOT-PACK III by Chris Hawks

- replacement for multipack
- 3 slots, 2 switchable, new hard switch
- X slot for RS-232 for modem (specify)
- middle slot can take disk controller or ROM cartridge
- 12 Volt adaptor required so power is not drawn from CoCo

MP III	slot pack III	$89.45
AC-12	12volt adaptor	$14.95

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20,000,000 Bytes or the equivalent to 125 R.S. 501's on line are packed into this hard drive, pre installed and ready to run. This complete easy to use package includes a Seagate 20 Meg Hard Drive, a DTC 5150 Controller and interface, * a heavy duty case, power supply and fan and a 1 year warranty. This 20 Meg Hard Drive will also work with Tandy and IBM clones.

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See Rainbow Reviews 8/89

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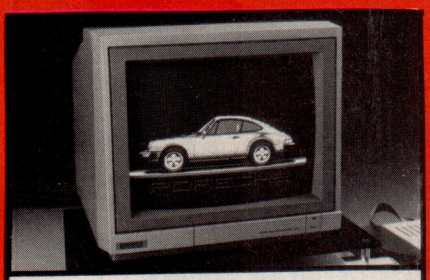

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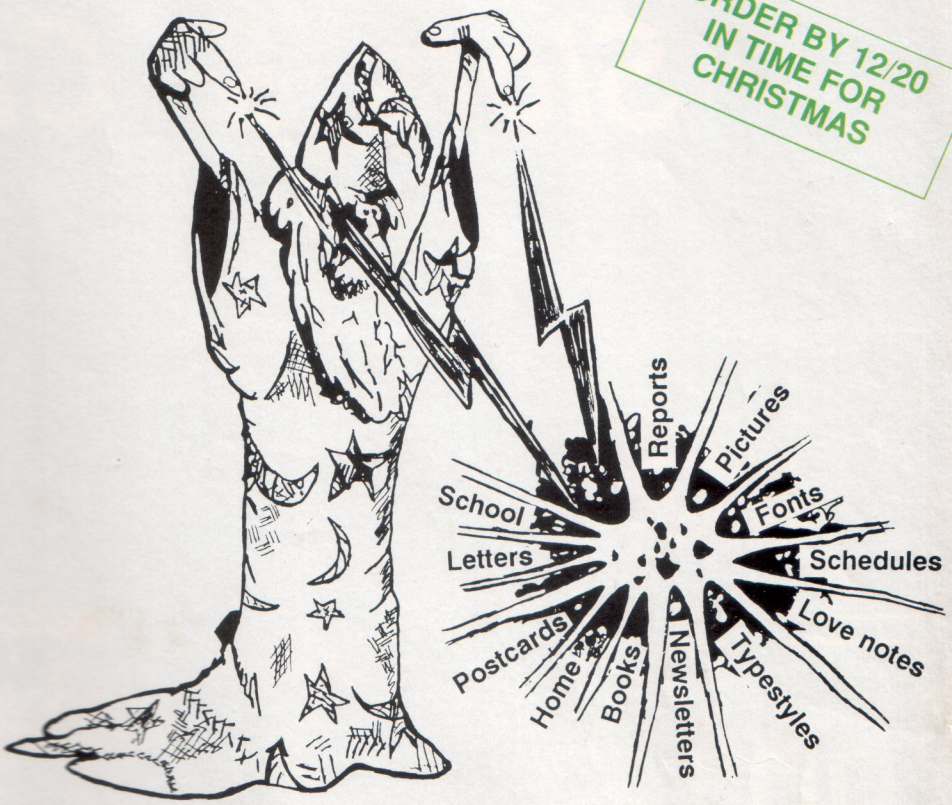

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About Max-10

What the CoCo Community needs is a word processor that's rock solid, blindingly fast, feels like a Macintosh, makes all the others look boring, and does not cost $80.

Max-10 is just that and more. It allows on screen mixing of graphics and text, large headlines, multiple columns and full page preview (with graphics).

We swear that Max-10 will add excitement to your word processing, and that's no small task!

PRINTERS SUPPORTED: EPSON FX,MX,RX,LX AND COMPATIBLES; DMP 105,106,130; CGP220 (B&W); OKI 182,92,192; STAR NX-10, NX-1000.

Max-10 Add-ons

- **Max-10 Fonts**. 36 super fonts on 2 disks. Send for list. Order #C-23 ....~~$29.95~~ **$14.95**
NOTE: Max-10 and CoCo Max Fonts aren't interchangable.
- **Spell Checker** 35,000 word dictionary for online spell checking and dictionary lookup. Perfect seamless integration with Max-10. Order #C-24.....~~$29.95~~ **$14.95**

System Requirements

Max-10 and CoCo Max III Require: any CoCo 3; 1 or more disk drives; joystick or mouse; Radio Shack Hi Resolution joystick interface; a video or RGB monitor or a TV.

About CoCo Max III

Whether you doodle for fun or design graphics for a living, **CoCo Max** will amaze you. It's simply that good!

Its major features include: Huge picture area (2 full hi-res 320x192 screens). Large editing window. **Zoom** mode for detail work. 28 point and click drawing tools. Shrink and stretch. **Rotation** at any angle (1.5° steps). 512K memory support (all features work with 128K too). Undo (Oops) feature to fix mistakes. **Animation**. Special effects. Color sequencing (8 colors, variable speed). 13 fonts (more available). Each font has 8 sizes and 5 styles for thousands of possible combinations. Translate program to convert most types of pictures. **CoCo Show** "slide show" program. Miniload program to help use pictures with your software. Color editing of patterns. Prints in single or double size. Select 16 of 64 available colors, all 64 colors are shown at once for easy selection. Pull-down menus. **40 paint brush** shapes. Two color lettering. Spray can. Amazing "flowbrush". RGB and composite monitor support. Colors print in 5 shades of gray.

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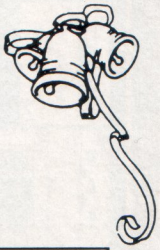

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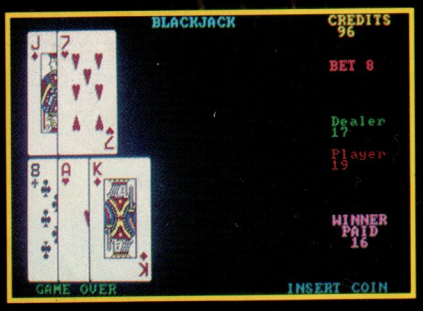

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